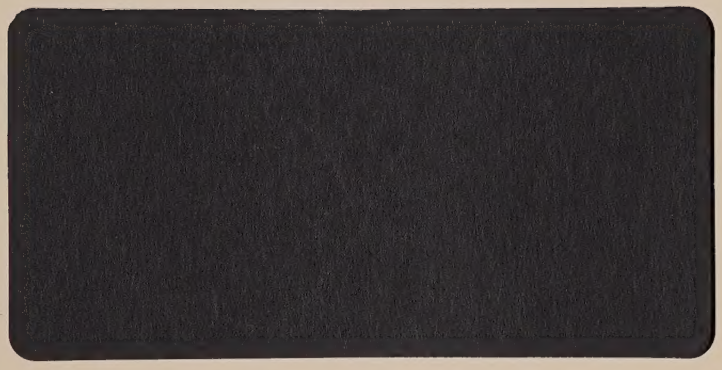

CXR telcom

MODEL 841A

PROTOCOL ANALYZER OPERATION MANUAL

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INTRODUCTION

1.0 GENERAL

The CXR Telcom 841A Network Protocol Analyzer is designed for comprehensive monitoring of data transmission and diagnosis of faulty systems. The high speed design of the 841A allows you to monitor full duplex lines up to 64K bps. Softkey operation, with layered menus, guides you quickly and easily through setup to analysis.

The 841A provides a combination of real-time and off-line English language decoding of X.25, SDLC/SNA, and Signalling System #7 frames. An optional ISDN basic rate interface card is also available. Each frame is time-stamped to one millisecond resolution. Each of the BOP protocols have special protocol "headers" (across the top of the screen) to flag many of the unique fields within a frame for easy reference.

Over 300 pre-defined trigger events in English mnemonics provide for quick Trigger Setups, which allow the user more productive time for troubleshooting the communication link. Triggers are provided for special frame fields, packet data, DTE data, DCE data, EIA lines, errors, etc., to eliminate the need for any programming to find a particular data problem on a line.

The feature called AUTOMONITOR can automatically determine the protocol and bit rate of the data transmission on one of the four selectable interfaces available on the rear panel.

With up to four built-in data interfaces (RS-232C, RS-449, V.35, and X.21) no external adapters will be required. The two RS-232 interfaces are passed through a convenient break-out box located on the front panel. Each of the RS-232 lines has its own switch and test points. Ten tri-state LEDs on the front panel indicate the state of the most common signal and control lines of the RS-232 standard.

A comprehensive Bit Error Rate Test operation is included within the box for qualifying the performance of the communication link. The BERT operation also provides automatic computations for BER (Bit Error Rate), BLER (Block Error Rate), and Longest Error Free Seconds (interval). Five patterns are available to choose from, as well as a "Fox" message and the ability to define a particular pattern.

Two external video outputs, one for RS-170 composite black and white and one for RGB color, provide the ability to attach large external TV monitors to the 841A. The RS-170 output can be used for rack-mounted TV monitors in the data center or video recording.

The parallel printer port (IBM PC-like) on the back of the 841A offers a means of retaining hard copies of the capture buffer and any display that is presented on the CRT screen. The printouts are created in graphics form on a standard dot-matrix printer that is Epson language-compatible.

The 841A also contains a 1.2M Byte floppy disk drive which utilizes a 3-1/2 inch Double-Sided High Density disk. Real-time recording of data from the line under test, as well as Configuration/Trigger setups, BERT setups and Async Terminal setups can be saved on disk for later retrieval.

1.1 HOW TO USE THIS MANUAL

This manual is both a reference manual and an instruction manual. As a reference manual, it is organized by function, and contains an INDEX to help you find information on a particular item or display. As an instruction manual, it contains numerous examples of applications for the 841A unit.

This manual is organized as follows:

Section 1	Introduction to the manual. A simple equipment description. Conventions of notation and terms used in the manual.
Section 2	An overview of the front and rear controls and connections of the 841A.
Section 3	A quick walk through the operation and menus.
Sections 4 thru 12	A more detailed look at the operation of each menu page selected from the Main menu screen.
Section 13	Information on the printing options.
Section 14	Disk operations. Real-time recording of data from the line under test, Disk copying and File System management.
Appendix A	Data Interfaces (RS-232, RS-449, V.35, X.21).
Appendix B	Signaling System #7 tables.
Appendix C	Definitions

1.2 MANUAL AND MACHINE CONVENTIONS

This manual will refer to terms such as: bytes, ASCII, BOP etc. To make sure that it is clear, here are a few definitions.

a. ALL communication data in this manual will refer to:
   - bits - a logical unit which can be in two states, 1 or 0.
   - bytes - a group of 8 bits
   - octet - a byte

b. The format of the byte can be:
   - general - 8 bits of any one of 256 different patterns.
   - ASCII - character code set, only 7 bits defined.
   - EBCDIC - character code set

c. Numbers:
   - digits - decimal or hexadecimal number
   - two digits - hexadecimal number
   - three or more - a decimal number, unless stated otherwise.

d. Signalling code abbreviations will be ASCII standard for Async or Bisync.
   Example:
   ETX= End of Text
   NAK= Negative Acknowledgement

e. Protocol specific code names may be abbreviated. Such as:
   BCC= Block Check Character
   FCS= Frame Check Sequence

f. Representation of Data:
   The transmit data (TD) and receive data (RD) are typically referred to as DTE (Data Terminal Equipment) and DCE (Data Communication Equipment) respectively. DTE data is displayed in normal video (white characters on a black background). DCE data is displayed in reverse video (black characters on a white background).
   For the RGB color out:
   - Green - Softkeys, Protected fields, Menu headers
   - Yellow/Orange - Monitored data, User entry fields
   - Red - Data errors, User error messages
   - White - Marking data, COP checksum

g. User Selections:
   User selections are typically made with the softkeys. The softkey selections are enclosed in brackets ([ ]). This is presented as [SK-1] for the first softkey label on the lower left corner of the display screen.

h. Notations:
   Notes are used in two ways: they either provide background or give additional information, or give you tips to make operating the 841A simpler and easier. *Notes are written in italics.* Major labels pertaining to the 841A screen will appear in capital letters such as MAIN menu or TRIGGER SETUP, etc.

i. Messages:
   From time to time, the 841A may flash either a CAUTION or WARNING message across the middle of the screen. These are intended to assist you in performing a specific operation, or inform you of the consequences of a given action.

APPLICATIONS

Application examples provide "hands-on" practice to assist you in learning various functions of the 841A Network Protocol Analyzer.

Description	Page
A. Fill the Capture Buffer with sample data, then "Re-Monitor" the Capture Buffer	3-5
B. Start and Stop the display when specific data characters are detected	3-10
C. Simulated BERT loopback test	3-11
D. "RAW" data display of X.25 and SDLC/SNA	4-4
E. Transparent Sync	4-4
F. Different ways to define a Data Trigger	5-2
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H. Automonitor on an unknown line	9-1

Appendix A - Data Interfaces (technical)

Appendix B - Signaling System #7

Appendix C - Definitions

Specifications

Warranty

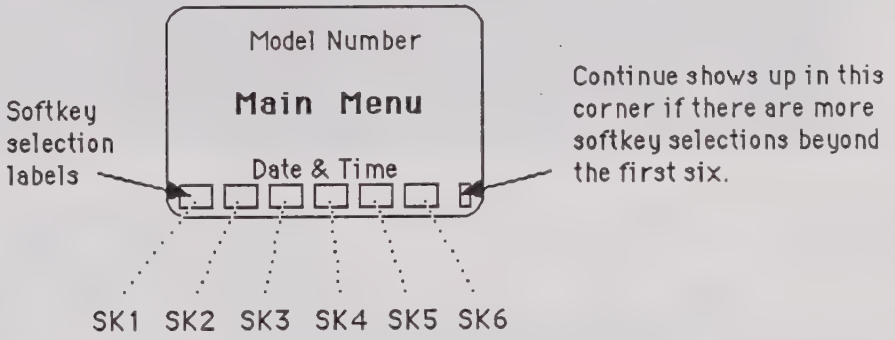
Controls and Connections

2.1 GENERAL

This chapter will describe each of the user controls and interface connections on the 841A. Simple maintenance procedures for servicing the Fuse, Fan filter and adjusting the brightness on the CRT are also covered.

2.1.1 SOFTKEYS

The most important user interfaces are the softkeys, which select the functions across the bottom of the CRT screen. The keys themselves are marked [SK-1] thru [SK-6], and on the CRT screen they are displayed as labels across the bottom. These short two-line phrases will help you to know what options are available on each menu page, and each menu item.

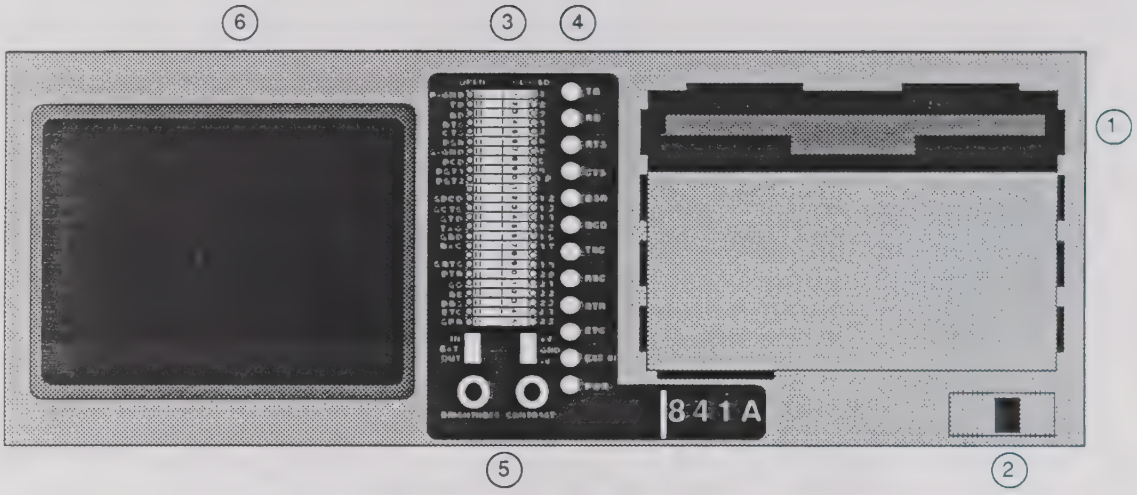

Model Number
Main Menu
Date & Time
Softkey selection labels
Continue shows up in this corner if there are more softkey selections beyond the first six.
SK1 SK2 SK3 SK4 SK5 SK6

A menu page can have from one softkey selection to six softkey selections, so the number of active entry keys will vary depending on the item selected. If there are more than six selections available, then the label CONT, for CONTINUE will show up in the lower right-hand corner of the screen. Just press the [CONT] key to show the next set of available selections. Every time the [CONT] key is pressed you will get the next six selections until there are no more, at which point you will find yourself back at the first selection set.

You will notice that many of the softkey labels are abbreviated since only about 6 characters can be placed within a label. Sometimes two softkey labels are linked together to provide a better description (12 characters).

Spend some time just making selections on the 841A so that you will become familiar with softkeys, including the [MAIN] and [PREV] keys. After selecting any function with a softkey, just press the [MAIN] key to return to the MAIN menu.

2.2 FRONT PANEL



Section

1. **Disk Drive:** The 841 uses 3 1/2 inch **HIGH DENSITY (HD)** diskettes. After formatting, the disk will hold 1.2 MegaBytes of information. The disk is used for recording capture buffer data or saving SETUP menus, such as Configurations and Triggers.

2. **Keyboard Interface:** A 4-pin modular telephone-type jack.

3. **RS-232C Breakout Panel:** This is a full in-line Break-out Box that is wired directly to the RS-232 IN and OUT connectors located on the rear panel. Each of the 25 signal leads have 2 TEST JACKS, one located on each side of the "break" switch. The switches are normally in the CLOSED position to allow for passive monitoring. The ten most common leads have Tri-State LEDs for visually observing the logic states.

   OFF - No signal present GREEN - space (logic 0)
   RED - mark (logic 1) ORANGE - Toggling between mark and space

   Logic Jacks: +V (approx. +12 v), -V (approx. -12 v) and GND (ground) are provided for test purposes.

   External Jacks: The IN and OUT jacks located below the breakout panel connect to logic circuits in the test set. The IN jack may be connected to any EIA Test Jack for monitoring the circuit or may be used as a trigger event. The OUT jack provides a signal when prescribed conditions are satisfied.

Trigger

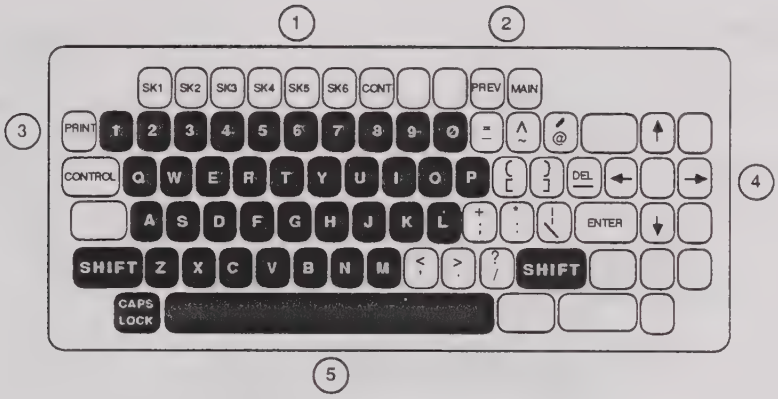
4. **LED Indicators:** The tri-state indicators monitor the 10 most common RS-232C leads.

Color	Meaning
RED	MARK (logic 1)
GREEN	SPACE (logic 0)
ORANGE	Toggle between mark and space (typical for clock leads).
OFF	Absence of specified voltage level.

5. **Video Controls:** Brightness and contrast adjustments of the CRT can be performed with a small screwdriver. All other adjustments are made at the factory.

6. **Video Display:** The monochrome CRT monitor provides a 16-line by 40-character display.

2.2.1 KEYBOARD INPUT

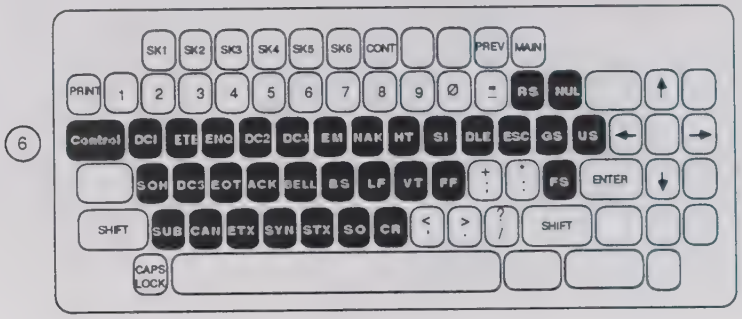


The 841A is operated with a detachable ASCII keyboard. Most operations can be performed using only the cursor direction keys plus the softkeys. The keyboard incorporates an extensive list of control codes which make it easier to set up triggers for character oriented protocols.

Reference	Name	Function
1	**Softkeys**	The six keys (SK-1 through SK-6) are used to make selections from the listing shown along the bottom of the CRT. When more than six choices are available, the [CONT] (continue) key is used to shift the menu to the next set of listings. When the last set is displayed, the next operation of the [CONT] key will wrap the display back to the first set.
2	**Display Control Keys**	Two keys provide control of the display: [MAIN] - returns the 841A to the initial display (MAIN menu). [PREV] - backspaces the display sequence by one screen page.
3	**Print Control**	This key operates similar to a camera "snapshot". When pressed, the 841A takes a "snapshot" of the display and sends the information out to the printer interface port. The printout appends the date and time at which the key was pressed to the top of the screen printout.
4	**Cursor Control Keys**	The four directions keys are used to move the flashing cursor to the desired location in the video display fields.
5	**Alpha-numeric Keys**	These keys are used to enter data, including setting the real-time clock and trigger setup. The basic alpha-numeric characters consist of the letters A to Z and the numbers 0 to 9. The keyboard includes all the standard symbols and can enter text in upper or lower case. This may be useful when setting up a data string as a trigger.
6	**Control Code Keys**	The keyboard provides the standard control characters shown in the next figure. These are entered in hexadecimal, by simultaneously

pressing the [CONTROL] key folowed by the control character key.

Control Code Keys (cont)



2.2.2 VIDEO DISPLAY

The 841A incorporates a 5-inch monochrome CRT. The maximum number of characters across is 40, and the total number of lines is 16. The screen is black and white so data, menus or errors are displayed in special formats.

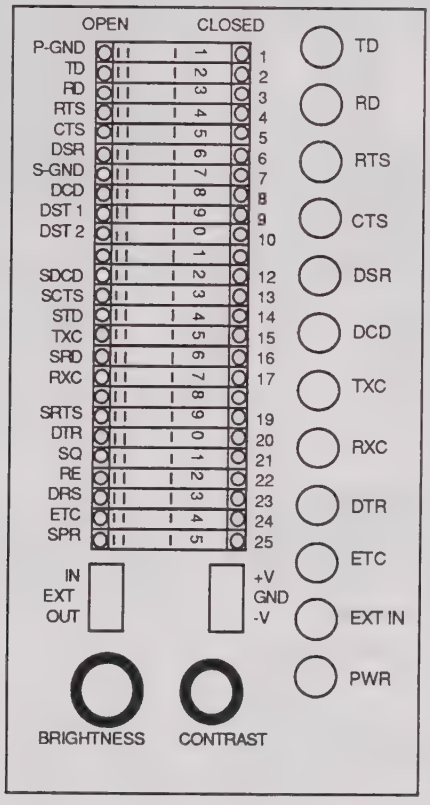
1. A half-bright level is used for softkey labels, menu headers, restricted entry fields or marking data.
2. Full intensity is used for DTE & DCE data, data entry fields and errors.
3. A flashing character is for an entry error condition, or error data captured in the buffer.
4. A single character area flashing at twice the rate is used for a cursor.

The brightness and contrast controls for this video display are set at the factory, but can be adjusted by the customer. Two small holes on the front panel under the break-out switches provide access to the screwdriver-adjustable controls.

2.2.3 BREAK-OUT PANEL

The front break-out panel is used to trouble-shoot an RS-232 serial interface by being able to open a signal path or re-route it. The break-out panel allows the user to open any one of the 25 possible lines.

TD, RD, RTS, CTS, DSR, DCD, TXC, RXC, DTR, and ETC each have associated LED indicators.



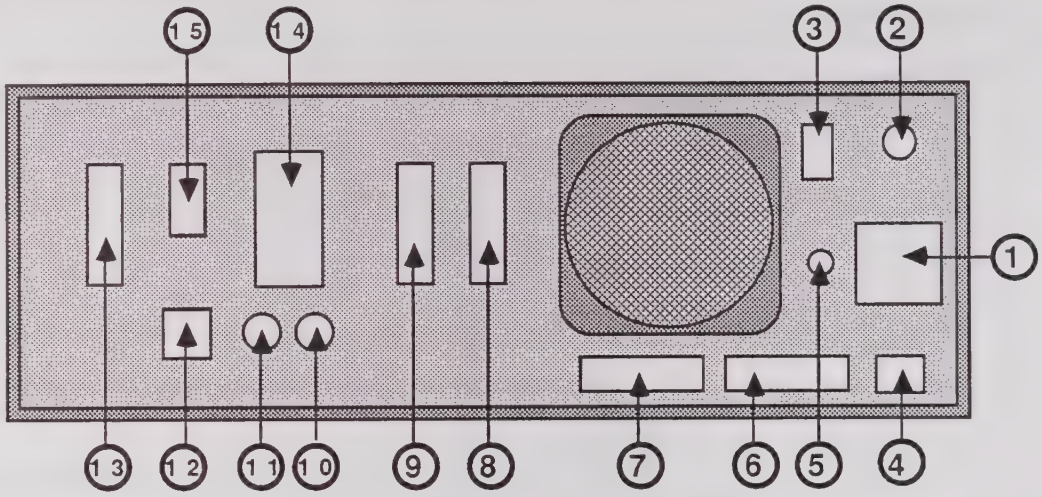
The input and output sides of the break-out panel electrically connected to the rear panel RS-232 connectors marked EIA IN and EIA OUT. The input to the break-out is to the left of the switch, and the output of the break-out is to the right. Each of the twenty-five RS-232 circuits have a test access jack on each side of the switch

Pins are provided at the bottom of the break-out for +12V and -12V to force the state of an EIA line. Also, an external input is provided so the user can trigger on any of the twenty-five lines of the break-out panel.

2.3 REAR PANEL

The rear panel is the distribution point of all the test interfaces. The 841A also provides two video output interfaces, a parallel printer interface, and a remote serial interface.

Be careful not to push the back of the 841A up against another surface, which might cause blockage of the fan used for cooling the unit. Be sure there is at least a 6-inch clearance at the back of the unit.



1 AC power input connector.
2 AC line voltage selector, 110 or 220 VAC. Should be set before powering up.
3 Power ON/OFF switch.
4 RGB video output, DB-9 connector.
5 Composite video output, BNC connector.
6 Remote control serial connector, DB-25.
7 Parallel printer connector, DB-25.
8 RS-232C IN, DB-25 connector.
9 RS-232C OUT, DB-25 connector.
10 Future interface
11 Future interface
12 Future interface
13 RS-449, DB-37
14 V.35 connector.
15 X.21 connector, DB-15

2.3.1 AC POWER

The 841A has been designed to accept a variety of power sources for US and European operation. The power supply operates on either 110 or 220 VAC. The voltage setting is switch-selectable and located on the back panel. The power input frequency can be 50 or 60 Hz with no manual setting required.

Only a simple screw driver is needed to change the line voltage. **Be sure it is set correctly BEFORE turning on the 841A, or you will damage the unit.**

2.3.2 FUSE

The 841A is protected with a 2A fast blow fuse located above the power receptacle, under the sliding plastic cover. To remove the fuse, disconnect the power cord from the rear panel. Gently pry the cover out with a screwdriver placed under the lip of the cover. Pull the fuseholder out and gently remove the fuse from the holder.

2.3.3 FAN FILTER

The fan filter on the back of the 841A unit should be cleaned periodically. A clean filter will extend the life of your 841A, since it will allow maximum air flow to ventilate the components within the box. The filter itself is held in place by a square plastic grill. Using a screw driver (or hand) lift up on the side of the plastic grill until the side snap releases. Remove the foam filter from the grill and dust off or wash it out. Reverse the process to snap the filter back on.

2.3.4 COMPOSITE VIDEO OUT

The 841A is equipped with an RS-170 composite video output female connector on the back panel. This will allow you to use a large external video monitor or projection TV for training. The video output will drive a standard 75 ohm coax line with a video level of about 1volt peak. Be sure to terminate at the TV monitor end of the cable with 75 ohms, or you may get a blurry picture. The composite video output is only black and white.

Note: If your external monitor does not display part of the text at the top or bottom of the screen, check the monitor for a vertical height adjust. The 841A uses 240 raster lines out of the 262.5 lines possible on a standard TV monitor. If the monitor has a lot of vertical or horizontal overscan (image beyond the edges of the screen), adjustments to the monitor should be madeto avoid having characters run off the screen.

2.3.5 RGB VIDEO OUT

To support color TV monitors, an RGB connector has been added to the back of the 841A for connecting to an IBM™ compatible display. The connector is a 9 pin DB-9 connector with TTL level signals coming out. This interface can not be run long distances without the proper termination at the TV monitor end. Recommended cable length should be no longer than 5 feet.

Pin out	Comment	Pin out	Comment
1	Ground	2	Ground
3	Red output	4	Green output
5	Blue output	6	Intensity (Grounded on the 841A)
7	Video output	8	Horiz. Drive
9	Vertical Drive		

There are presently only four colors used in the screen data on the 841A.

Color	Used for	Color	Used for
Green	Softkeys, Protection fields, Menu headers	Yellow-orange	Monitored data, user entry
Red	Data errors, user entry errors	White	Marking data, COP checksum

*IBM is a trademark of International Business Machines.

2.3.6 PARALLEL PRINTER OUT

This connector is located near the bottom center of the back panel. The connector is a DB-25 and is laid out to accept the standard cable for an IBM PC-compatible printer. The only pins used on this interface are: Strobe, Data lines, Acknowledge, Busy and Ground lines.

Pin	Comment
1	Data Strobe, Negative logic
2	D0 data line
3	D1 data line
4	D2 data line
5	D3 data line
6	D4 data line
7	D5 data line
8	D6 data line
9	D7 data line
10	Data Acknowledge, Negative logic
18 - 25	Ground
11	Busy

2.3.7 REMOTE SERIAL OUT

This connector is located near the bottom right corner of the back panel. The connector is a DB-25 and is configured as a DTE device for plugging directly into a modem. Input impedance is 3K to 7K ohms. Signal requirements are:

Pin	Comment
2	TD, transmit data from the 841A to the modem
3	RD, receive data to the 841A from the modem
4	RTS, request to send. Set to +5V.
7	SG, signal ground
8	DCD, data carrier detect to the 841A from the modem
20	DTR, data terminal ready from the 841A to the modem

2.3.8 RS-232C MONITOR CONNECTORS

There are two connectors located near the middle of the back panel. The connectors are of the DB-25 female type with both connected to the break-out panel on the front panel. The connector labeled RS-232 IN goes to the left row of break-out sockets on the front panel. The connector labeled RS-232 OUT goes to the right row of break-out sockets on the front panel and the input of the 841A monitor interface. The small switch on the break-out panel connects the two RS-232 connectors together. The input impedance is 33K ohms (shunted by 500 pfd).

Pin	Comment
1	FG, frame ground
2	TD, transmit data
3	RD, receive data
4	RTS, request to send
5	CTS, clear to send
6	DSR, data set ready
7	SG, signal ground
8	DCD, data carrier detect
15	TXC, TD clock from DCE
17	RXC, RD clock from DCE
20	DTR, data terminal ready

24 ETC, clock from DTE

2.3.9 V.35 MONITOR CONNECTOR

This connector is located near the left side of the back panel. This female connector has 34 pins per the CCITT V.35 specification. All data and clock lines are balanced signal line pairs, while the handshaking lines meet the RS-232 signal level specification. The input impedance is greater than 3.3K ohms shunted by 50 pfd for monitoring.

Pin	Comment
A	Protective ground
B	Signal ground
P	Transmit data +
S	Transmit data -
R	Receive data +
T	Receive data -
C	Request to send
D	Ready for sending (CTS)
E	Data set ready
H	Data terminal ready
F	Data carrier detect
*U	Transmitter timing +, DTE source
*W	Transmitter timing -, DTE source
y	Transmitter timing +, DCE source
a	Transmitter timing -, DCE source
V	Receiver timing +, DCE source
X	Receiver timing -, DCE source

* These signals are referenced in V.36 spec.

2.3.10 X.21 MONITOR CONNECTOR

This connector is located near the left side of the back panel. The connector is a DB-15 female type. All data, clock, and handshaking lines are balanced signal line pairs. The input impedance is greater than 1K ohms shunted by 50 pfd for monitoring.

Pin	Comment
1	Protective ground
8	Signal ground
2	TA, transmit data +
9	TB, transmit data -
4	RA, receive data +
11	RB, receive data -
3	CA, control + (RTS)
10	CB, control -
5	IA, indication + (DCD)
12	IB, indication -
6	SA, signal timing + (TXC)
13	SB, signal timing -

2.3.11 RS-449 MONITOR CONNECTOR

This connector is located near the left side of the back panel. The connector is a DB-37 female type. All data, clock, and handshaking lines are balanced signal line pairs. The input impedance is greater than 1K ohms shunted by 50pfd for monitoring.

Pin	Comment
1	Shield
19	SG, signal ground
4	SD+, send data
22	SD -
6	RD+, receive data
24	RD-
7	RS+, request to send
25	RS-
9	CS+, clear to send
27	CS-
11	DM+, data mode (DCD)
29	DM-
12	TR+, data terminal ready
30	TR-
13	RR+, receiver ready (DSR)
31	RR-
17	TT+, terminal timing DTE source
35	TT-
5	ST+, send timing DCE source)
23	ST-
8	RT+, receiver timing
26	RT-

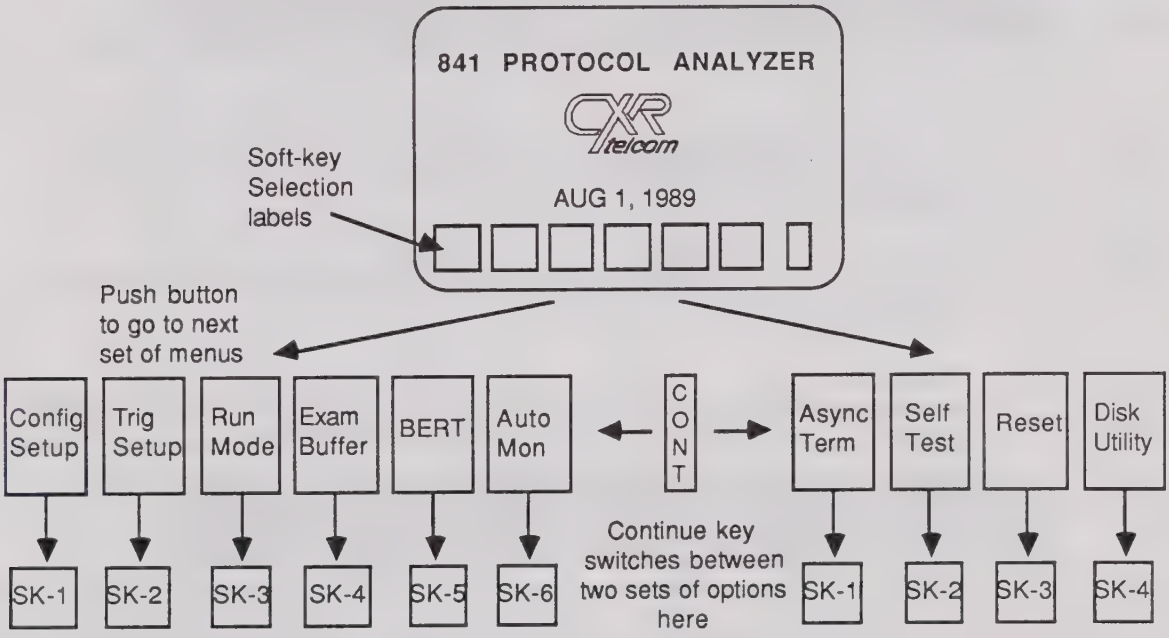
Basic Operation

3.1 GENERAL - MAIN MENU PAGE

Let's look at each of the second-level menus that can be accessed from the MAIN screen. The number of features will vary as more options are made available for the 841A. The diagram below shows nine softkey selections. Remember, no matter how "deep" you go into the sub-menus, the MAIN key will get you back to the first screen.

The MAIN menu allows you to setup the protocol to receive data, run the capture data mode, and then later examine in more detail the data received. The more advanced user will also set "triggers" to look for a specific data character or string of characters, count events or measure time between events. This operation will require you to become familiar with the first four softkeys (SK-1 to SK-4) on the MAIN menu level.

Here is a preview of the MAIN menu selections.



Softkey	Features
[SK-1]	**Configuration Setup** Matches the 841 to the line under test. Allows for selecting the protocol and the associated parameters such as: bit rate, code, number of data bits per character and so on.
[SK-2]	**Event Trigger Setup** Triggering can be used to display only selective data, count events, measure time between events,"mark" data for quick reference in later examination, or sound an alarm upon a specified data pattern or error condition.
[SK-3]	**Run Mode** The entry point to capture (with or without trigger) data from the RS-232, V.35, RS-449, X.21 interfaces.

[SK-4] **Examine capture buffer**
Review the data captured. Search for events, print the buffer, observe the data in relation to the EIA leads (RS-232 only), observe time-stamps on bit-oriented protocols, display a character value in hex, decimal, octal and binary.

[SK-5] **BERT**
Bit error rate testing tests the communication line for the percentage of bit errors.

[SK-6] **Automonitor**
The 841A will attempt to determine the line parameters such as the protocol, code, bit rate, sync characters, etc., and begin displaying the data.

Pressing the [CONT] key will bring forth the next set of labels to the screen.

[SK-1] **Async Terminal**
Use the 841 to emulate a "dumb" terminal. You can set the baud rate, local echo, EIA handshaking etc.

[SK-2] **Self test**
841A check out routines and Software Revision Number. Test the keyboard, video, display character sets, TV alignment grid, test memory.

[SK-3] **Reset options**
Master system software reset, plus individual resets for: date & time, capture buffer, and each of the other Main menu pages.

[SK-4] **Disk Utility**
Record monitoring sessions for further analysis, or to extend the capacity of the main capture buffer. Also save SETUP menus for common Trigger and BERT Setups.

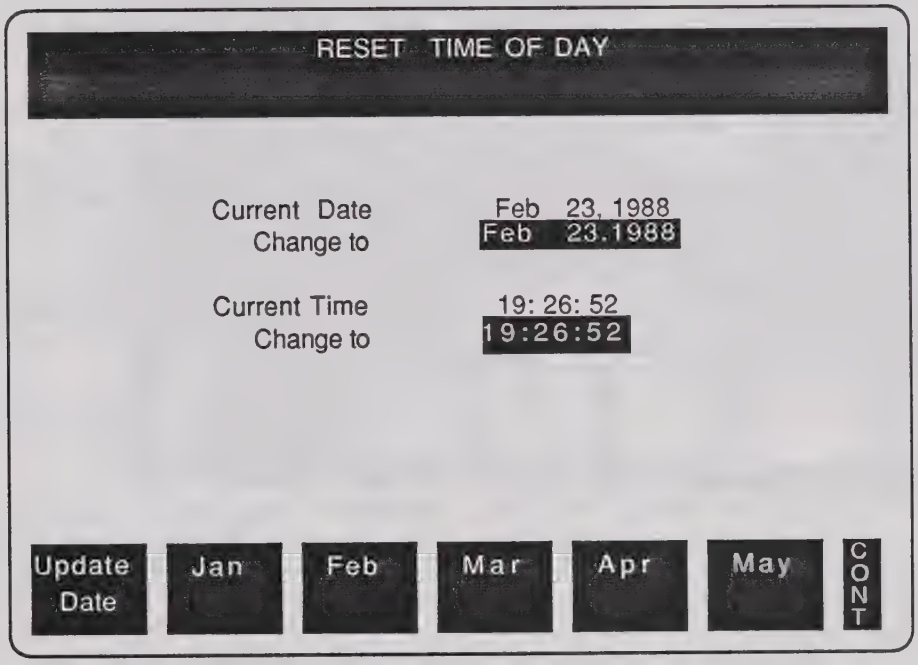
Now that you have an overview of the functions available, move on to the next section (3.2) and set the date and time.

3.2 FIRST TIME START-UP (Reset functions)

Assuming that you have just received the 841A, and the time (or date) on the MAIN screen is not correct (or the batteries were replaced), then the unit should be reset to initial software conditions.

At the MAIN menu, press the [CONT] key until one of the softkey label displays the name RESET. Press the RESET softkey [SK-3]. The SYSTEM reset [SK-1] is the one you should press next. This key will reset ALL of the screen pages in the 841A to their default states.

Now let's set the date and time. Press the DATE&TIME softkey [SK-2] within the reset menu page. You should get the following screen (actual time and date will be different):

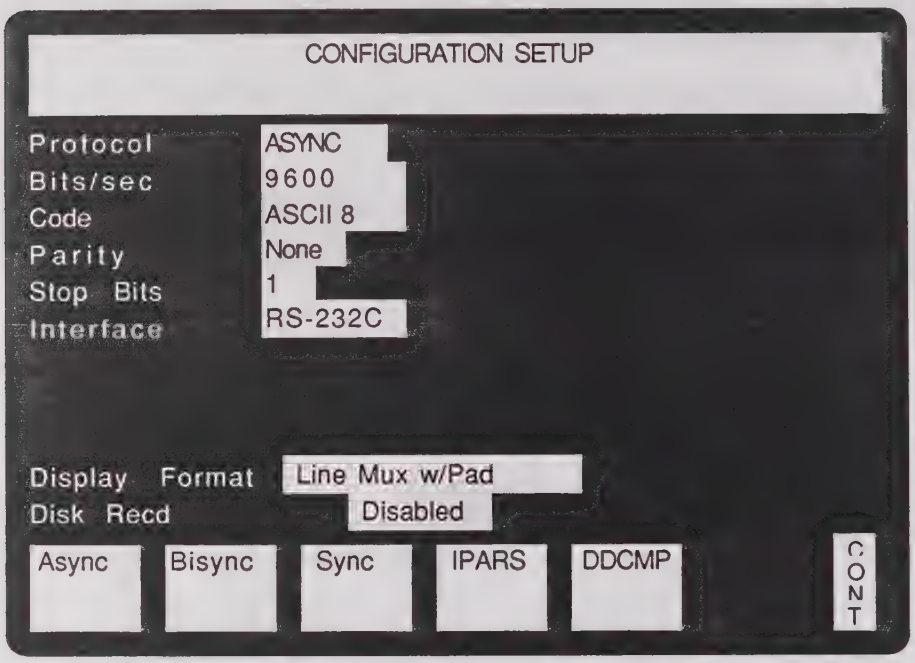


The first five months show up on the softkey labels, if the cursor is flashing in the date field. You will note that the first softkey [SK-1] states "Update Date" and it will transfer the new date in the inverted video field to the "Current Date" field. By pressing the [CONT] key, you will see the other months. After entering the month, day and year, press [CONT] to get back to the first set of months and press [SK-1] to UPDATE DATE.

The time is updated in the same manner.

3.3 CONFIGURATION PAGE

Now we can pretend to set up to capture some data on the 841A. Press the [MAIN] key to go back to the MAIN menu. Press the first softkey [SK-1] for CONFIG SETUP. You should now see the screen entitled "CONFIGURATION SETUP".



You can see that there are a variety of protocols displayed across the bottom of the screen. Select ASYNC [SK-1], and press that softkey. Using the down arrow key, you can step down through the user selectable fields. Take a few minutes and step through each of the fields. Notice that the softkey titles change, and occasionally the user entry fields also change. Each protocol has a unique group of parameter selections available. The 841A tries to eliminate unnecessary information or impossible combinations for each selection to reduce the chance of confusion or error in the user's entry. After pressing the down arrow about sevcn times, you should be back to the top field.

Note that the field next to the menu option INTERFACE is in low intensity. This field is not user selectable. ASYNC has been preset for only the RS-232 interface with a maximum baud rate of 19.2K bits per second.

The set up page for ASYNC contains the necessary user options to receive data:

Bits/sec	50 to 19.2K, From DTE clock, From DCE clock
Code	ASCII 7, ASCII 8, EBCDIC, EBCD 6, HEX 6, HEX 5.
Parity	None, Odd, Even
Stop Bits	1, 1.5, 2

The next field is DISPLAY FORMAT. This field determines how the data will be presented to the screen when the RUN mode is selected. There are five selections:

Line Mux with Pad . . . . . Pad (fill) the display of the channel not receiving data with blanks to show time relationship between TD & RD. TD& RD data are displayed on separate text lines.

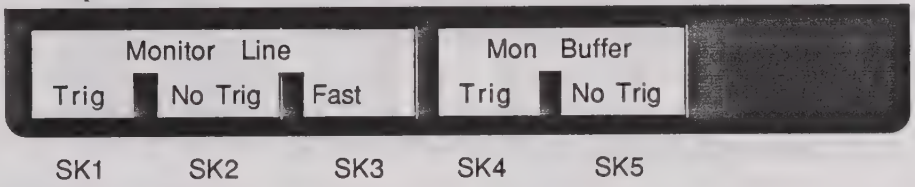
DTE only	Displays only TD info, RS-232 pin 2.
DCE only	Displays only RD info, RS-232 pin 3.
Time Mux	Mixed data displayed on a first-come first-displayed basis, the TD and RD data are on the same line.
Line Mux with EIA	Displays TD & RD data in relation to the level change of the EIA handshaking lines; RTS, CTS, DSR, DCD shown graphically.

At this time leave the display format setting for LINE MUX W/PAD.

For introduction purposes, let's run ASYNC with its defaults values. The configuration page will maintain (remember) your selections when you go to another menu page. It is not necessary to press a save or store key on the 841A. By pressing either the [PREV] or [MAIN] key, the 841 will return to the MAIN menu page. Now go to the next section (3.4) to RUN the monitoring feature.

3.4 RUN PAGE

At the MAIN menu, press the RUN MODE softkey [SK-3]. The screen contains five softkey selections:



The softkey selections are divided into two groups:

MONITOR LINE, data entering the 841 from the back panel interfaces (three selections), and
MONITOR BUFFER, "re-monitor" data stored in the buffer (two selections).

The 841A is designed with the ability to play back the capture buffer again and again once a session of data has been captured into the buffer. The re-monitor feature can be very useful, as you will see in section 3.7 and later in chapter 5, to analyze data which has specific problems.

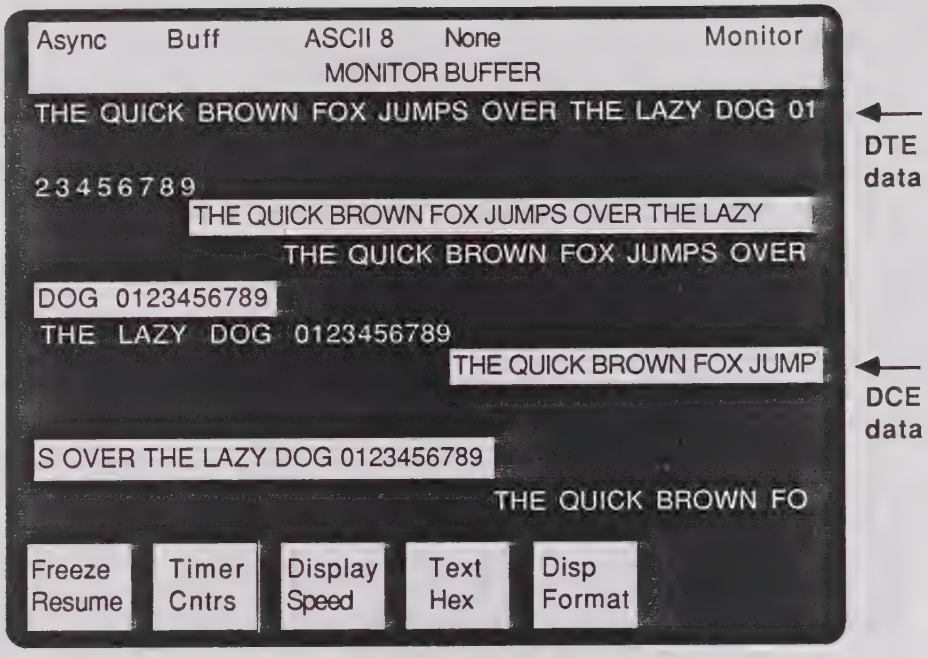
APPLICATION
Objective: Fill Buffer and Remonitor Buffer

Begin at the MAIN menu (press the [HOME] key until the Date and Time are displayed on the screen).
1.) Select the desired protocol on the CONFIGURATION page as described in section 3.3.
2.) Press the [MAIN] key.
3.) Press the [CONT] key.
4.) Press softkey [SK-3], RESET.
5.) Press the [CONT] key.
6.) Select softkey [SK-2], FILL BUFFER.
7.) Press softkey [SK-3], PROTOCOL DATA.

The message "FILLING CAPTURE BUFFER" will flash on the screen as the buffer is filled with "sample" data. After a few seconds the message "CAPTURE BUFFER FILLED" will appear indicating that it is safe to proceed.

8.) Press the [HOME] key to return to the MAIN menu.

For this first operation , we will select softkey [SK-3] for the RUN mode, and since there is no **Live** data connected to the 841A yet we will use the MONITOR BUFFER. Now press [SK-5] for MON BUFFER - NO TRIG. You should now see data moving across and down the screen.



The communication data being shown from the DTE side of the line will be in normal video (white characters on black), while the DCE side of the line will be in inverse video (black characters on white). As you can see, the data is the "QUICK BROWN FOX" message. If this were a "live" line with no data coming in, the 841 would display the message "WAITING FOR DATA" in the middle of the screen.

The Header Status field (across the top of the screen) provides the following information:

> Protocol (async), Source of data (buffer), Data format (ASCII-8-None),
> and Mode of operation (monitor).

This status line will change depending upon the protocol that was selected in the Configuration Page, or the type of data saved in the buffer. ASYNC, SYNC, BISYNC, IPARS & DDCMP will all have similar status lines, but X.25, SDLC and SS#7 will use the top lines as headings for the different bit fields within a frame.

Across the bottom of the screen, five more softkey selections are available while monitoring data from the buffer:

- Freeze/Resume
- Timer & Counters (Chr. Oriented Protocols) OR Statistical Counters (Bit Oriented Protocols)
- Display Speed
- Text/Hex
- Disp Format

Take some time to try each softkey now. If you reach the End-of-Buffer before you have tried each softkey selection, just press [PREV] and [SK-5] again to repeat the re-monitoring.

Each of these functions will be covered in more detail in the following chapters, but this should begin to familiarize you with the 841A. Go to section 3.5 now to examine the data buffer more closely.

3.5 EXAM BUFFER PAGE

From the MAIN menu, select softkey [SK-4]. Upon entering the Exam Buffer mode the top two status lines change to reflect various information about the data and cursor position, such as hex and binary equivalent values of a specific data character, CURRENT BLOCK/FRAME position and LAST BLOCK/FRAME of data within the buffer. The cursor will be flashing in the upper left corner of the data screen, which can be moved down, up, left or right with the arrow keys on the keyboard. The status line will display the hex, decimal, octal and binary values of a character by positioning the cursor directly over the character. A "block" of data is equal to two to three display pages in ASYNC, SYNC, BISYNC, IPARS and DDCMP, due to Display Formats and additional overhead information appended to each data character as the data enters the 841.

In the "QUICK BROWN FOX" message, the cursor will be located in the upper left corner on the T in THE. Notice that the HEX value equals 54 and the BINARY value is 01010100.

The bottom softkeys have changed to provide 9 new choices. The CONT flag is displayed in the lower right-hand corner of the screen indicating that there are more softkeys selections available. Pressing the [CONT] key will show the other 3 selections.

Previous Page	Move back one SCREEN in the data buffer
Next Page	Move forward one SCREEN in the data buffer
Hex/Text	Change character to Hex format or Text
Goto block	Go to a specific block number between block 1 and last block.
Search Event	Use a trigger (defined in the TRIG SETUP page) to search through the buffer.
Display format	Change the way data is displayed.
Timers/Counters	Display timer/counter page (used with TRIGGER SETUP)
Bit shift	Display the data bit shifted (Character Oriented Protocols only)
Print Buffer	Print several blocks of data from the buffer.
Statistics Counters	Available only in X.25 and SDLC. Provides automatic counters for level 2 and level 3 activities.

At this time, try each of the softkey selections and observe the results.
You have now CONFIGURED the 841A, RUN the monitor function, and EXAMINED the data. Go to the next section to get a hard copy print-out if you have a printer, or skip the next section.

3.6 PRINTING

The 841 allows any display screen to be printed at any time by pressing the [PRINT] key. This feature is very useful for maintaining history copies on a hard copy printout of monitored data, Configuration setups, Trigger setups and BERT setups. Each printed screen is time and date stamped across the top of the printed page.

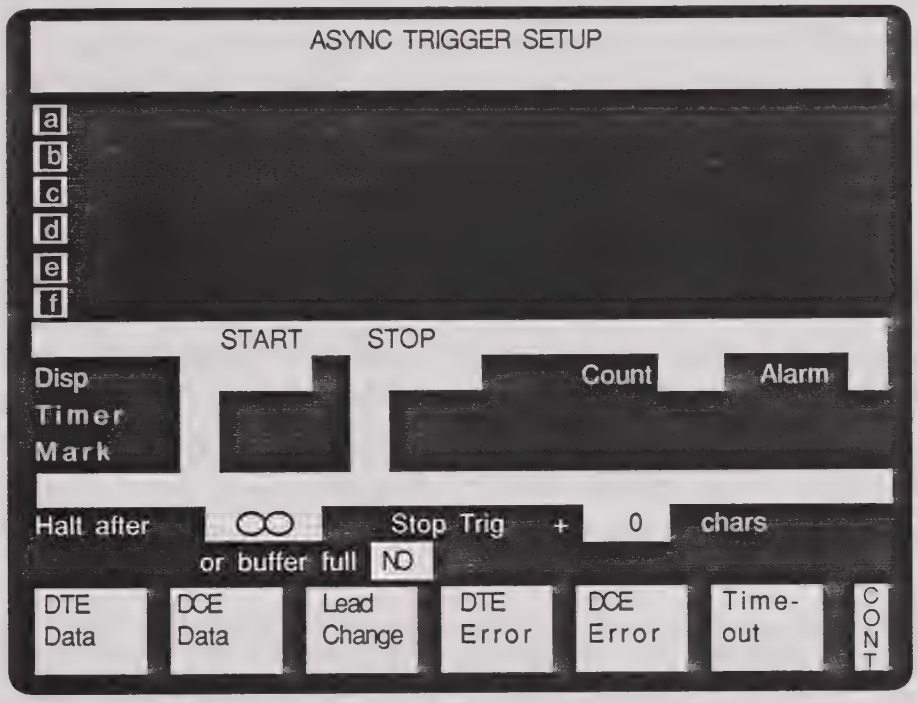
In the EXAM BUFFER mode, selecting [PRINT BUFFER] causes a "snap-shot" image of the screen to be transferred to the print buffer and sent out to the printer. The 841 will print single or multiple blocks (or frames) of data from the capture buffer. Async, Bisync, Sync, IPARS and DDCMP data are printed in "blocks", where one block is the equivalent of two to three screens. X.25, SDLC and Signalling System #7 protocols are printed based on frame numbers. In both cases the print selection prompts you to enter both a "Starting Block" (or Frame) number, followed by an "Ending" block (frame) number. After defining the range to be printed, complete the process by pressing [SK-1], as instructed by the message at the bottom of the screen. The printer can't reproduce the difference between highlighted and unhighlighted characters, but it can reproduce inverted video characters and normal characters. Two screens can be printed on an 8-1/2 X 11 inch page, and each screen print-out will be time and date stamped at the top for future reference.

The 841 uses a parallel printer interface to connect to the printer. The printer interface is compatible with most dot matrix graphic printers, such as the Epson FX-86E™ type printers. The interface cable should be the standard IBM PC parallel printer cable, consisting of a male DB-25 connector on one end with the 36-pin male Centronics connector on the other end. There are no special set up requirements for either the 841 or the printer.

Now on to the trigger function in section 3.7.

3.7 TRIGGER PAGE

At the MAIN menu, press the TRIG SETUP softkey [SK-2]. You will now see a screen with the title "ASYNC TRIGGER SETUP".



What does a trigger do?

The trigger function is used to selectively display data, count events, measure time between data events, mark data for later examination, or sound an alarm when a specified data pattern or EIA lead state is detected. EXAMINE BUFFER is a manual way of inspecting the captured data for problem determination, while MONITOR LINE - TRIG is an automatic method of detecting errors.

Not all triggering operations are for solving problems. Triggering is also used for performance testing such as: measuring the time between frames, counting the number of special frames coming through per minute, or monitoring network recovery time from an error.

What type of events can I trigger on?

This discussion will focus on ASYNC selections. Refer to section 5 on Trigger Options for X.25, SDLC & SS#7 protocols.

The following events are available as softkey selections across the bottom of the screen:

Selection	Comment
DTE Data	Any ASCII, Hex, or binary data pattern up to 16 bytes
DCE Data	Any ASCII, Hex, or binary data pattern up to 16 bytes
Lead Change	RTS ON or OFF
	CTS ON or OFF
	DCD ON or OFF
	DTR ON or OFF
	DSR ON or OFF
	IN ON or OFF (Ext. input on break-out panel)
DTE Error	Such as Parity, Framing and BCC.
DCE Error	Such as Parity, Framing and BCC.

Time-out Up to 9999 seconds to stop the monitoring.

The trigger page gives you several options:

Display start/stop
Counter
Alarm
Timer start/stop
Mark start/stop
Halt after XXX triggers
+ XXX chars

APPLICATION

Objective: To display only the data inside of two (defined) boundaries. The boundaries can be a data character, a string of data characters, an EIA lead change or an expiration timer.

Example: Turn the display ON when the DTE side of the line detects the string QU , then turn the display OFF when the DCE side of the line detects the character K .

The capture buffer should still have the "QUICK BROWN FOX" pattern; if not, return to section 3.2 to fill the buffer.

The six event reference letters (A-F) on the left side of the screen are the Event Definition designators. These allow you to define one to six separate data, EIA lead change or expiration timer events. We will set the boundaries by defining two events, one as DTE DATA and the other as DCE DATA. With the cursor in the "Event A" field, press [SK-1] DTE DATA, then notice that the cursor has moved to the right, and the screen headers are now prompting you to make an entry. Now type the letters QU .

Using the down-arrow key, go to the next line for event B. Press [SK-1] for DCE DATA. The cursor has now moved to the right, and the screen prompts for another entry. Type the letter K .

Using the down-arrow key, move the cursor to the START field, under the Display Start / Stop columns. All of the softkey labels have now changed to represent Event A through Event F. Select [SK-1] for event A. Move cursor to the right under STOP, and enter event B [SK-2]. We are going to start the screen display when QU is detected on the DTE side, and then stop the display when K is detected on the DCE side.

Now let's run this trigger. Press the PREV or MAIN key and go back to the main menu, then select RUN MODE [SK-3]. Now select MON BUFFER - TRIG [SK-4]. You can press [SK-1] to freeze the display to see what is happening. The display should have only the word "QUICK" plus two special event marking characters. These special characters indicate where the trigger started the display (event A), small "A" within a square box, and where the trigger stopped the display (event B), small "B" within a octagonal box. The octagon is a small stop sign which marks which trigger stopped the display.

Now add a counter to the trigger page. Press the MAIN key twice. Press [SK-2] to go back to the TRIGGER SETUP page. Move the flashing cursor down to the field next to COUNT (under the START/STOP heading) and press [SK-1] for event A. The 841A will count every time it sees a "QU" in the data buffer. Press the MAIN key then [SK-3] for RUN. Select [SK-4] again to monitor from the buffer with trigger. Now press [SK-2] TIMER CNTRS to see the Timer/Counter page. Counter 1 should now have a value greater than 0, since it is counting the QU's. By selecting back and forth the RESUME DATA [SK-1]) from this page, and [SK-2] in the RUN mode you can observe the count increase as the buffer is played back. Try some of the other Trigger combinations and observe their actions.

3.8 BERT PAGE

Press the [MAIN] key twice to make sure you are at the main MAIN page.

BERT, or Bit Error Rate Test is a method of testing the performance of the transmission line. This is accomplished by sending and/or receiving a known psuedo-random data stream and checking it for errors. Single bit errors or multiple bit errors (bursts) can be caused by line noise or an equipment malfunction. For leased-line applications an acceptable error rate is one bit error per million, or better. The 841 will measure one bit in error out of 1000 million (10^{-9}). The 841A can generate pseudo-random block patterns of 63, 511, 1023 and 2047 bits, alternate 1's and 0's, the FOX message, and a user defined pattern up to 48 bits.

APPLICATION
Objective: BERT simulated loopback test.

NOTE: Disconnect any cable connected to the RS-232 monitor connectors on the back of the 841A.

SET UP: Connect a jumper wire between pin 2 and pin 3 on the front panel break-out box.

At the MAIN menu, press the BERT softkey [SK-5]. The BERT SETUP screen is now displayed. Begin the set up configuration at the PROTOCOL field by selecting ASYNC. Leave the remaining parameters at their default settings.

Start the test by selecting RUN [SK-6].

The 841A will provide real-time information on BLOCKS RECEIVED, ERROR BLOCKS, ERROR BITS, ELAPSED SECONDS, ERRORED SECONDS, ERROR FREE SECONDS, LATEST ERROR FREE SECONDS (interval of time from last errored second) and SYNC LOSS COUNT. At the end of the test (DURATION field in set up parameters), or when you manually stop the test, the values are given for:

Bit Error Rate
Block Error Rate
Error Seconds Rate
Longest Error Free Seconds

Both the XMIT BLKS and RCV BLKS fields should be incrementing if the jumper is in place. If data is not being received at the start of the test, the message WAIT FOR DATA will be displayed, which would occur if the jumper was not installed before you ran the test. If, however, data is received at the start of the test, and then stops being received, the message OUT OF SYNC will be displayed.

The bottom softkeys [SK-1 & SK-2] allow you to inject forced (controlled) errors into the data stream. Two methods are available, either a single Bit Error, or a Burst of multiple errors. Burst Errors are controlled by selecting a NOISE level. NOISE level is a means of controlling the duration that the bit stream is corrupted. The higher the noise level number, the longer the duration of burst errors.

The setup parameter RESET COUNTERS ON SYNC LOSS affects all Receive counters except SYNC LOSS. If YES is selected, then every time a SYNC LOSS is detected the counters will reset to zero. If NO is selected then all counters will remain intact.

3.9 ASYNC TERMINAL

At the MAIN menu, press the [CONT] key, then select ASYNC TERM [SK-1]. As a general utility, the 841A can be operated as a simple asynchronous ASCII terminal.

Run	Yes or No
Bits/sec	50 to 9600 baud
Code	ASCII 7, ASCII 8
Parity	None, Even or Odd
Stop bits	1, 1.5, 2
Local Echo	On or Off
Handshake	Yes or No

The Local Echo selection is for operating with a half duplex system which doesn't echo back the characters you are typing.

The handshake option is for the hardware interface to use the RTS, CTS, DCD, or DTR lines to start and stop communication with the other system.

3.10 SELF TEST PAGE

These tests are provided for system integrity testing. They are:

a. Video check out
b. Keyboard button test
c. EIA interface tests
d. Memory test

System Software revision information is also displayed on the main Self-Test page.

Video test
The video test allow you to select each character set, test the attributes and color, or display an alignment grid for internal or external CRT calibration.

Keyboard test
The keyboard test gives a visual display of each key being depressed. The screen shows an image of the keyboard. As each button ispressed the character within the keyboard image of the screen will be inverted. There is also a "memorize" mode selection which will save each depressed key.

EIA test
This page allows you to check the RS-232, V.35, RS-449 & X.21 interfaces for clock rates, handshake line states or the activity of the data line. The EIA test will display the clock frequency to the nearst ten hertz.

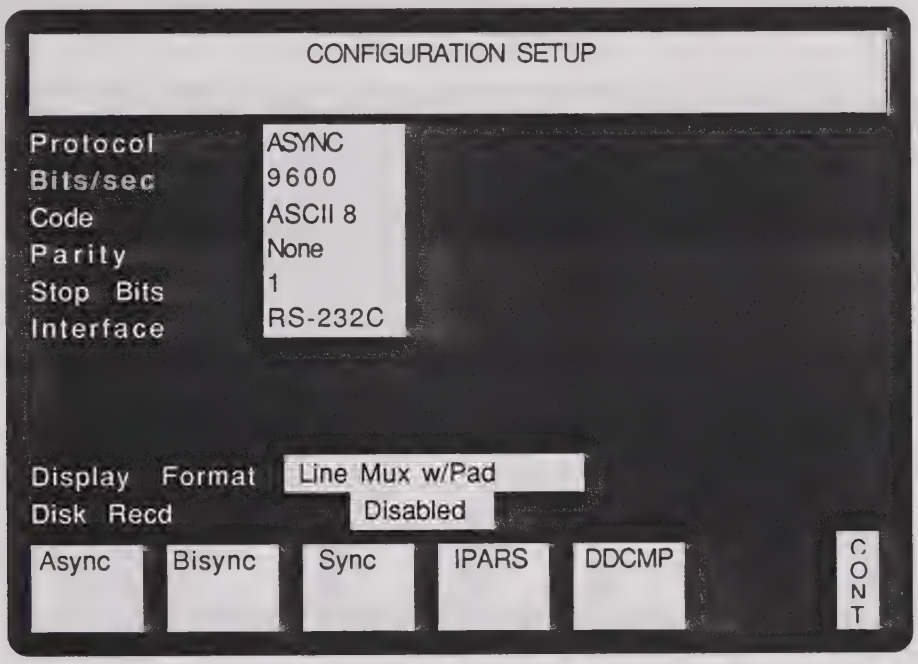
NOTE: Due to the sampling of the interface connector signals, it will take a few seconds to exit this test when you press [PREV] or [MAIN] a couple of times.

RAM test
The memory test is extensive, but data destructive so don't run this test if you have data in the capture buffer that you want to save. The only way to make a comprehensive test for address or data line failures is to fill all of the memory with special patterns. Each word of memory is tested 34 times. When you multiple 512K of RAM by 34 , you get a test of about 1.5 minutes.

Configuration

4.1 ASYNCHRONOUS

This is the first of the five Character-Oriented protocols available on the 841A. The configuration page appears as follows:



The ASYNC configuration page has four protocol parameter fields that are user-changeable, one Display Format field, and a Disk Record operation for the RUN MODE. The Display Format field will determine how the data will be presented to the screen in the Run mode and Exam Buffer mode.

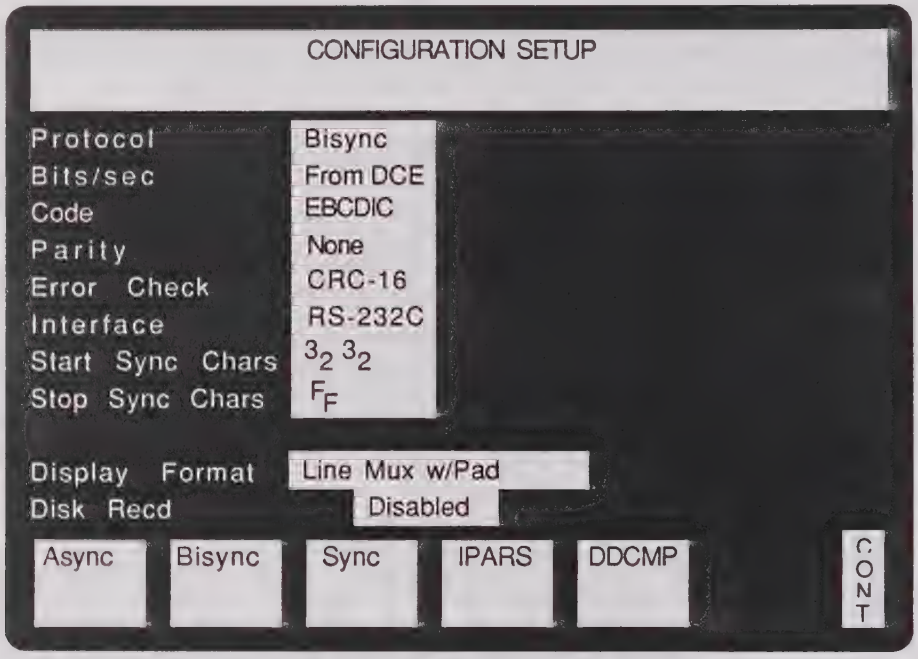
Parameter	Default	Range
Protocol	Async	
Bits/sec	9600	50 to 19.2K Bps
Code	ASCII 8	ASCII 7, ASCII 8, EBCDIC, EBCD-6*, HEX 6 and HEX 5
Parity	None	None, Odd, Even
Stop Bits	1	1, 1.5, 2
Interface	RS-232C	RS-232C, V.35, RS-449, X.21
Display format	Line Mux w/Pad	Line Mux with Pad, Line Mux with EIA, DTE only, DCE only, Time Mux
Disk Record	Disabled	Enabled, Disabled

NOTE: The selected protocol will also set (or tailor) the Trigger Setup page.

* EBCD-6 This code set is defined as 6 bits per data character, however, the 841A will display eight bits. With this method, the MSB (most significant bit) location will be set to a logic 1 when in the "shift" mode. The seventh bit will always be set to a logic 0.

4.2 BISYNCHRONOUS

This is the second of the five Character-Oriented protocols available on the 841A. The configuration page appears as follows:



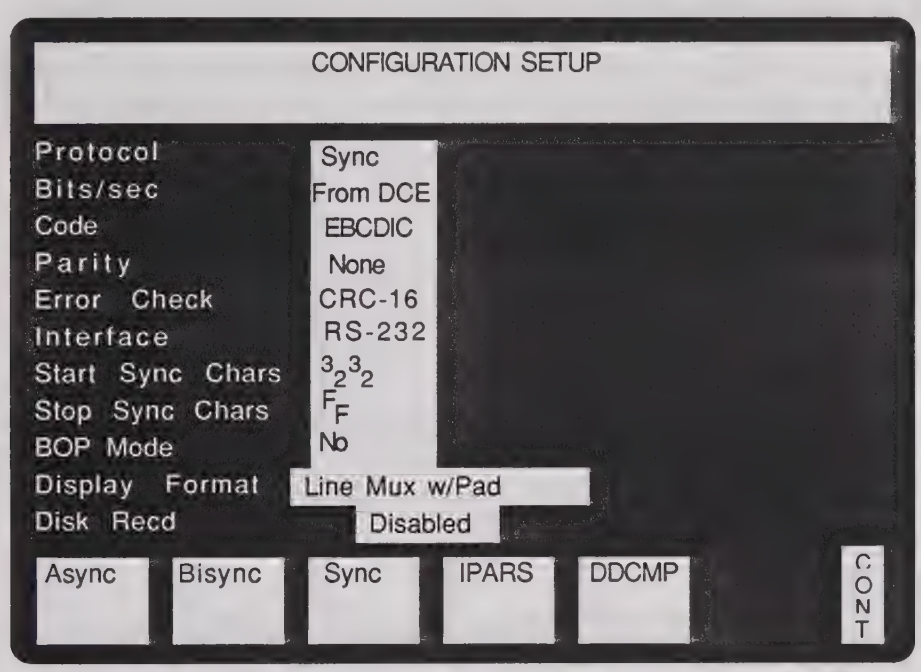
The BISYNC configuration page has three protocol format fields that are user-changeable, one Display Format field, and a Disk Record operation for the RUN MODE. There are four additional parameters that are non-selectable by protocol definition. The Display Format field will determine how the data will be presented to the screen in the Run mode and Exam Buffer mode.

Parameter	Default	Range
Protocol	Bisync	
Bits/sec*	From DCE	50 to 64K Bps, Ext. clock from DTE or DCE
Code	EBCDIC	ASCII 7, EBCDIC
Parity	None	(non-selectable) ASCII 7 default = Odd
Error Check	CRC-16	(non-selectable) ASCII 7 default = LRC
Interface	RS-232C	RS-232, V.35, RS-449, X.21
Start Sync Chars	$32\ 32$	(non-selectable) ASCII 7 default = $16\ 16$
Stop Sync Chars	FF	(non-selectable)
Display format	Line Mux w/Pad	Line Mux with Pad, Line Mux with EIA, DTE only, DCE only, Time Mux
Disk Record	Disabled	Enabled, Disabled

* Since ALL synchronous protocols must provide a clock, the default selection is FROM DCE which is the most common setup that will be encountered. If you don't see any data in the RUN MODE, try FROM DTE for the BITS/SEC field.

4.3 SYNCHRONOUS

This is the third of the five Character-Oriented protocols available on the 841A. SYNCHRONOUS is a generic set of parameters which allows the user to define all of the set up parameters. It can be configured for "special" conditions such as Air Canada's Reservak reservation system. The configuration page appears as follows:



The SYNC configuration page has ten protocol parameter fields that are user-changeable, one Display Format field, and a Disk Record operation for the RUN MODE. Selecting SYNC on this page will also preset the TRIGGER page for synchronous operation. The Display Format field will determine how the data will be presented to the screen in the Run mode and Exam Buffer mode.

Paramter	Default	Range
Protocol	Char Sync	
Bits/sec*	From DCE	50 to 64K Bps, Ext. clock from DTE or DCE
Code	EBCDIC	ASCII 7, ASCII 8, EBCDIC
Parity	None	None, Odd, Even
Error Check	CRC-16	LRC, CRC-16, RVK (Reservak), None
Interface	RS-232C	RS-232, V.35, RS-449, X.21
Start Sync Chars	32 32	Any two byte patterns (an X in box indicates "Don't Care"character, same as Transparent Sync).
Stop Sync Chars	FF	Any one byte pattern (an X in box indicates "Don't Care"character, same as Transparent Sync).
BOP Mode	No	No, NRZ, NRZI.
Display format	LineMuxw/Pad	Line Mux with Pad, Line Mux with EIA, DTE only, DCE only, Time Mux
Disk Record	Disabled	Enabled, Disabled

* Since ALL synchronous protocols must provide a clock, the default selection is FROM DCE which is the most common set up that will be encountered. If you don't see any data in the RUN MODE, try FROM DTE for the BITS/SEC field.

The **BOP Mode** selection is used to display Bit-Oriented Protocol data in its "raw" (hexadecimal) form. The BOP Mode selection automatically sets the Start Sync character and Stop Sync character, and thus overrides any values set in the Start and Stop Sync character parameter fields.

APPLICATION
Objective: "Raw" data display of Bit Oriented Protocols.

X.25 and SDLC can also be displayed in RAW (hex) form which will allow the opening and closing flags to be displayed with the frame of data.

Begin on the Configuration Setup page by selecting [SYNC] protocol [SK-3]. The SYNC parameter selections can be defined independently. Select the following parameters:

PROTOCOL	= [SYNC]
DATA RATE	= [FROM DCE]
CODE	= [ASCII-8] for X.25, or [EBCDIC] for SDLC
PARITY	= [NONE]
BOP MODE	= NRZ or NRZI (as required by the line under test).

Set the remaining parameters as appropriate.

After completing the Configuration setup, press the [MAIN] key followed by selecting the RUN mode [SK-3]. Once in the RUN mode, all data will be displayed in hex. Each frame will have an opening flag and a closing flag. No error checks will be performed in this mode.

APPLICATION
Objective: Transparent Sync

This feature is used for monitoring synchronous character-oriented protocols. The display may show legible data that suddenly becomes garbled. Random hits on the communications line frequently add a bit or two to the data stream. The Bit-shift function can be used to decipher the data or locate the garbled bit.

For the synchronous protocols, the 841A searches the data stream for Sync Characters before it starts logging the data into the Capture Buffer. Using the CHAR SYNC protocol allows us to define each of the line parameters associated to the data line being tested. In this example we will assume that we are not sure what the Sync and Resync Characters are. Start at the CONFIG SETUP page and set the line parameters as follows:

PROTOCOL	= CHAR SYNC
BIT RATE	= FROM DCE
CODE	= As required
PARITY	= As required
ERROR CHECK	= None
INTERFACE	= As required
START SYNC	= DON'T CARE
STOP SYNC	= DON'T CARE

2. After setting the Configuration proceed to the RUN mode. Begin logging in the data. After you have accumulated a sufficient amount of data into the capture buffer, exit the RUN mode by pressing either the [PREV] or [MAIN] keys.

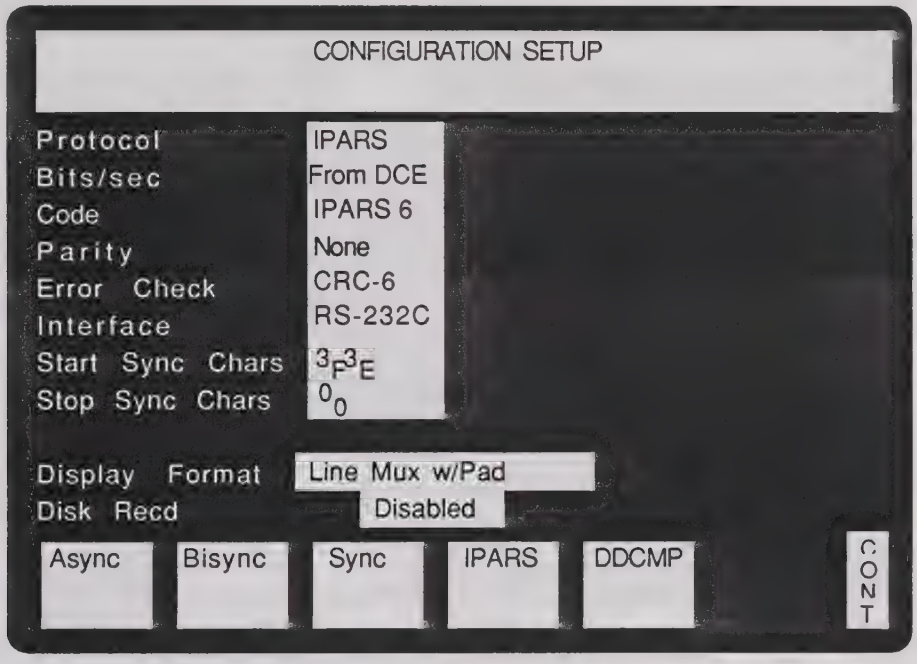
NOTE: The displayed data may not be synchronized.

3. Now select [SK-4] EXAM BUFFER from the MAIN menu.

4. Press the [CONT] key. Use [SK-2] BIT SHIFT to shift one data bit to the right, up to eight positions, or until the data is legible.

4.4 IPARS

This is the fourth of the five Character-Oriented protocols available on the 841A. The configuration page appears as follows:



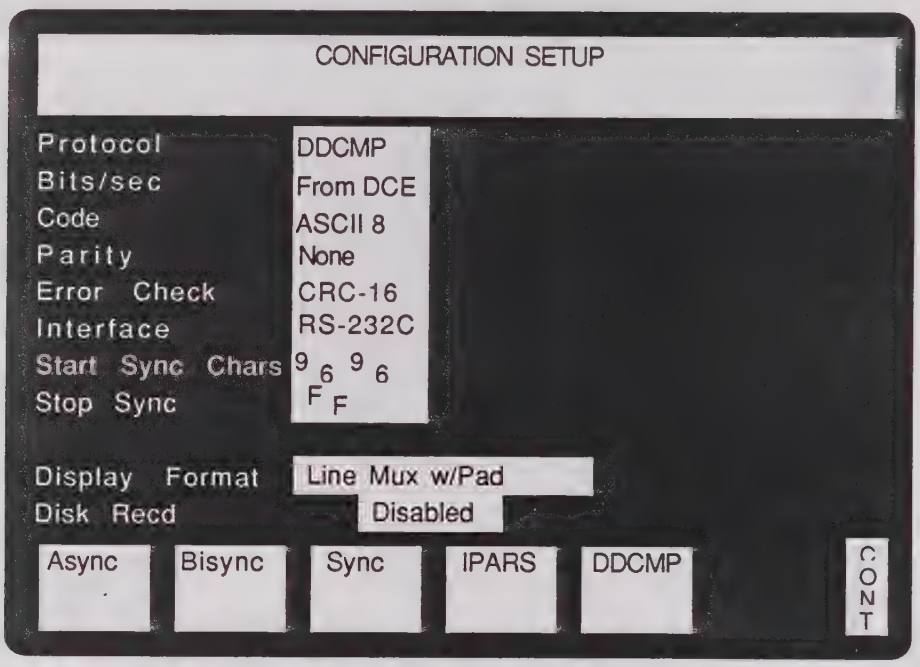
The IPARS configuration page has nine protocol parameter fields that are user-changeable, one Display Format field, and a Disk Record operation for the RUN MODE. The Display Format field will determine how the data will be presented to the screen in the Run mode and Exam Buffer mode.

Parameter	Default	Range
Protocol	IPARS	
Bits/sec*	From DCE	50 to 64K Bps, Ext. clock from DTE or DCE.
Code	IPARS 6	(non-selectable)
Parity	None	(non-selectable)
Error Check	CRC-6	(non-selectable),
Interface	RS-232C	RS-232, V.35, RS-449, X.21.
Start Sync Chars	3F 3E	(non-selectable)
Stop Sync Chars	00	(non-selectable)
Display format	LineMuxw/Pad	Line Mux with Pad, LineMuxwith EIA, DTE only, DCE only, Time Mux.
Disk Record	Disabled	Enabled, Disabled

* Since ALL synchronous protocols must provide a clock, the default selection is FROM DCE which is the most common set up that will be encountered. If you see no data in the RUN MODE, try FROM DTE for the BITS/SEC field.

4.5 DDCMP

This is the last of the Character-Oriented protocols available on the 841A. The configuration page appears as follows:



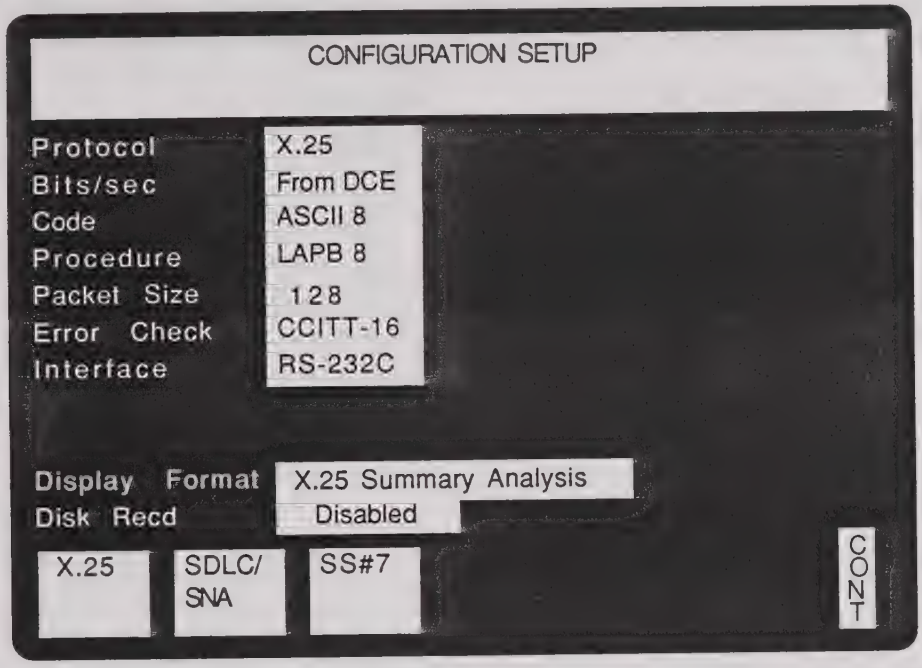
The DDCMP configuration page has five protocol format fields that are user-changeable, one Display Format field, and a Disk Record operation for the RUN MODE. The Display Format field will determine how the data will be presented to the screen in the Run mode and Exam Buffer mode.

Parameter	Default	Range
Protocol	DDCMP	
Bits/sec*	From DCE	50 to 64K Bps, Ext. clock from DTE or DCE.
Code	ASCII 8	(non-selectable)
Parity	None	(non-selectable)
Error Check	CRC-16	(non-selectable)
Interface	RS-232C	RS-232, V.35, RS-449, X.21.
Start Sync Chars	96 96	(non-selectable)
Stop Sync Chars	FF	(non-selectable)
Display format	LineMuxw/Pad	Line Mux with Pad, LineMux with EIA, DTE only, DCE only, and Time Mux.
Disk Record	Disabled	Enabled, Disabled

* Since ALL synchronous protocols must provide a clock, the default selection is FROM DCE, which is the most common set up that will be encountered. If you see no data in the RUN MODE, try FROM DTE for the BITS/SEC field.

4.6 HDLC/X.25

This is the first of three Bit-Oriented protocols available on the 841A. The configuration page appears as follows:



The HDLC/X.25 configuration page has five protocol parameter fields that are user-changeable, one Display Format field, and a Disk Record operation for the RUN MODE.

Parameter	Default	Range
Protocol	X.25	
Bits/sec*	From DCE	50 to 64K Bps, Ext. clock from DTE or DCE.
Code	ASCII 8	ASCII 7, ASCII 8, EBCDIC
Procedure	LAPB 8	LAP, LAPB 8, LAPB 128 (LAPB 8= modulo 8, LAPB 128= modulo 128)
Packet Size	128	128, 256, 512, 1024, 2048, 4096, 16K.
Error Check	CCITT-16	(non-selectable)
Interface	RS-232C	RS-232, V.35, RS-449, X.21
Display format	X.25 Summary	X.25 Summary, X.25 Detailed, QLLC Summary, QLLC Detailed
Disk Record	Disabled	Enabled, Disabled

* Since ALL synchronous protocols must provide a clock, the default selection is FROM DCE, which is the most common set up that will be encountered. If you see no data in the RUN MODE, try FROM DTE for the BITS/SEC field.

Packet Size controls two functions within the 841. First, it sets how many packets can be stored into the 841's capture buffer by setting aside a "block" of memory (1024, 512, 256 bytes, etc.) for each frame of data. Secondly, it is used for detecting "long" frames. If the frames are small, then the capture buffer can be partitioned into more storage areas for the frames. If you don't know your system's packet size, start with a packet size of 1024, then work down to 512, 256, and so on.

The **Display Format** is changeable when monitoring from the line. During re-monitor or examine modes, the time stamp per frame and packet data can be displayed by selecting the display format DETAILED.

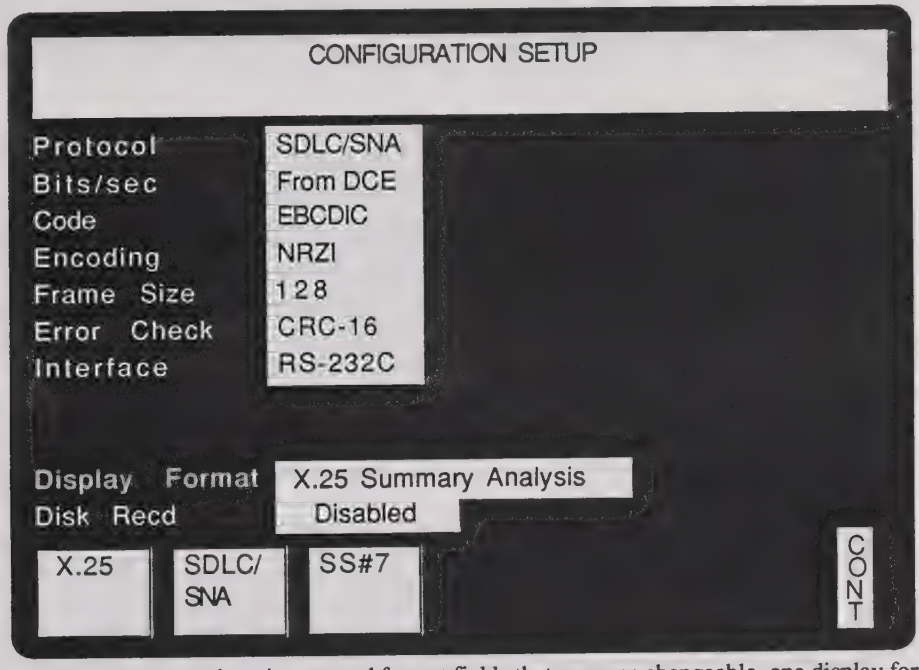
4.6.1 QLLC ANALYSIS

QLLC, Qualified Logical Link control, is selected on the CONFIGURATION SETUP page under the parameter DISPLAY FORMAT. When selected, QLLC frame level data will be presented in English mnemonics. QLLC occurs when the "Q" bit is set to a logic one. The following is a list of QLLC frame level functions:

QLLC FUNCTION	HEX VALUE
QSM	93
QDISC	53
QXID	BF
QTEST	F3
QRR	F1
QRD	53
QUA	73
QDM	1F
QFRMR	97

4.7 SDLC/SNA

This is the second of the three Bit-oriented protocols available on the 841A. The configuration page appears as follows:



The SDLC/SNA configuration page has six protocol format fields that are user-changeable, one display format field, and a Disk Record operation for the RUN MODE. Selecting SDLC on this page will also preset the TRIGGER page for SDLC operation.

Parameter	Default	Range
Protocol	SDLC/SNA	
Bits/sec*	From DCE	50 to 64K bps, Ext. clock from DTE or DCE
Code	EBCDIC	ASCII 7, ASCII 8, EBCDIC
Encoding	NRZI	NRZ, NRZI
Frame Size**	128	128, 256, 512, 1024
Error Check	CCITT-16	(non-selectable)
Interface	RS-232C	RS-232, V.35, RS-449, X.21
Display format	SDLC Summary	SDLC Summary, SDLC Detail, SNA Summary, SNA Detail
Disk Record	Disabled	Enabled, Disabled

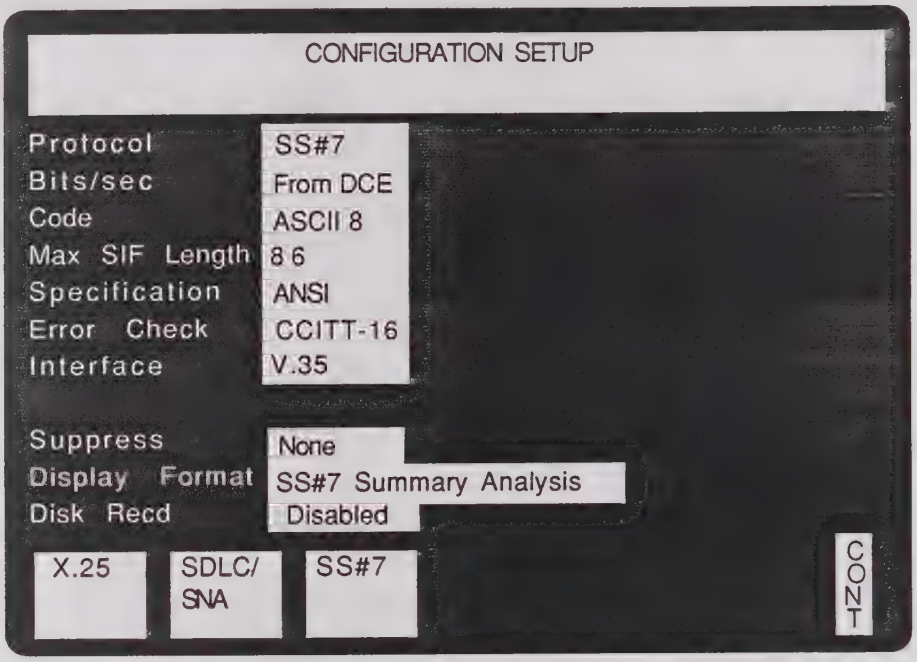
* Since ALL synchronous protocols must provide a clock, the default selection is FROM DCE, which is the most common set-up that will be encountered. If you see no data in the RUN MODE, try FROM DTE for the BITS/SEC field.

** **Frame Size** controls two functions within the 841. First, it sets how many frames can be stored into the 841A's capture buffer by setting aside a "block" of memory (1024, 512, 256 bytes, etc) for each frame of data. Secondly, it is used for detecting "long" frames. If the frames are small, then the capture buffer can be partitioned into more storage areas for the frames. If you don't know your system's frame size, start with a frame size of 1024, then work down to 512, 256 and so on.

The **Display Format** is changable when monitoring from the line. During re-monitor or examine modes, the time stamp per frame and packet data can be displayed by selecting the display format DETAILED.

4.8 SS#7

This is the third of the Bit-Oriented protocols available on the 841A. The configuration page appears as follows:



The SS#7 configuration page has five protocol format fields that are user-changeable, one Display Format field, and a Disk Record operation for the RUN MODE.

Parameter	Default	Range
Protocol	SS#7	
Bits/sec*	From DCE	50 to 64K bps, Ext. clock from DTE or DCE
Code	ASCII 8	(non-selectable)
Max SIF Length**	86	86, 146, 272
Specification	ANSI	CCITT, AT&T, ANSI
Error Check	CCITT-16	(non-selectable)
Interface	V.35	RS-232, V.35, RS-449, X.21
Suppress	None	None, FISU, FISU&LSSU
Display format	SS#7 Summary	Summary, Detail or Split Screen
Disk Record	Disabled	Enabled, Disabled

* Since ALL synchronous protocols must provide a clock, the default selection is FROM DCE, which is the most common setup that will be encountered. If you see no data in the RUN MODE, try FROM DTE for the BITS/SEC field.

** **SIF Length** controls how many octets can be stored into the 841A's capture buffer. The 841A sets aside a "block" of memory for each SS#7 frame. If the frames are small, then the capture buffer can be partitioned into more storage areas for frames. If you don't know your system's SIF size, then start with a frame size of 272, then work down to 146, then 86.

The **Display Format** is changeable when monitoring from the line. During re-monitor or examine modes, the time stamp per frame and packet data can be displayed by selecting the display format DETAILED.

The Specification field sets the size of the label field in the MSU (Message Signalling Unit). By CCITT standards, it is specified as 14 bits for DPC and OPC. The AT&T standard is 21 bits for the DPC and OPC. The ANSI specification is the largest label field of 24 bits for DPC and OPC. In most U.S. cases, this field should be set to ANSI mode, where the European standard is CCITT.

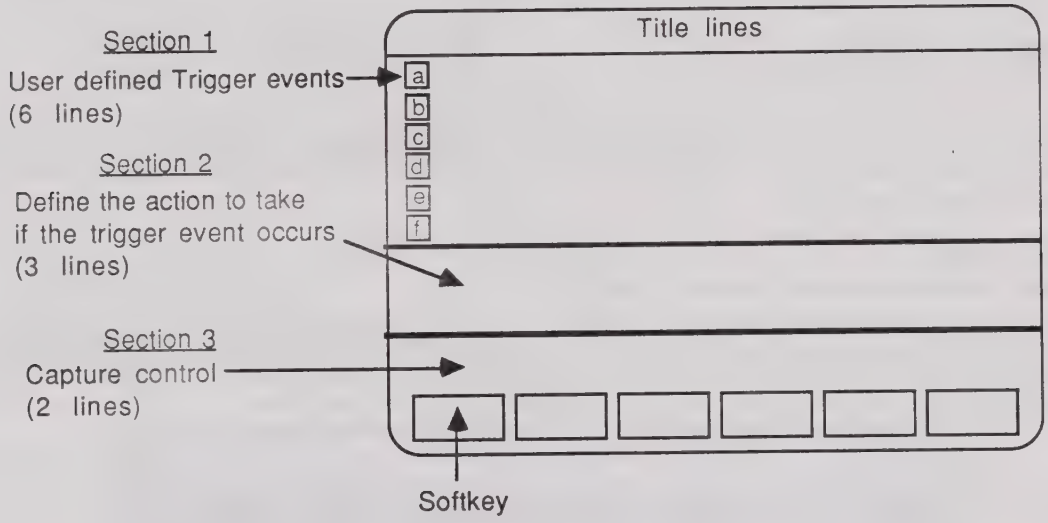
The interface selections for this protocol are; RS-232, or RS-449, or V.35 connectors. The typical interface will be V.35.

SUPPRESS is a "filtering" operation. In this protocol the IDLE line condition contains a continuous data pattern known as FISU's (Fill-in Signalling Units). Since the data is coming in at 56K or 64K bps full duplex, the Capture Buffer would fill very quickly with essentially useless data, when we are most concerned with MSU's (Message Signaling Units). The SUPPRESS option will allow you to eliminate (not accumulate in the Capture Buffer) all FISUs, or LSSUs (Link Status Signalling Units) and FISUs.

Trigger Options

5.1 GENERAL TRIGGER PAGE

The Trigger Setup page has been customized for each protocol to add specialized and pre-defined triggers for unique fields within that protocol definition. The protocols ASYNC, BISYNC, SYNC, IPARS and DDCMP all share the same Trigger Setup page, whereas X.25, SDLC and SS#7 have a different Trigger page, with their own pre-defined and user-defined events. To get the desired page, select the protocol in the CONFIG SETUP page before entering the trigger setup page.



Trigger Setup page diagram

The Trigger Setup page is divided into three sections:

Section 1: Definition Field: Six lines are provided for defining the different trigger events per the available softkey selections. The letter within the box to the left of each line is used as a reference name to be entered in section 2 for triggering an *action*.

Section 2: Action Field: Three lines for specifying the action to take when the defined trigger event is detected. The actions are:

1. START/STOP
   a. DISPLAY - sets the boundaries for turning the display (of data) On and Off.
   b. TIMER - sets the boundaries for turning the Timer On and Off.
   c. MARK - sets the boundaries for marking the data in high intensity video. This allows for quick finding of the marked data when reviewing or searching in the Exam Buffer mode.
2. COUNT - Counts the number of occurences of an event on one of three counters.
3. ALARM - Sounds the alarm upon the detection of an event.

The Bit-Oriented protocols (X.25, SDLC and SS#7) contain two additional Action fields. They are:

1. SELECT - Displays only the specified frame type. All data is accumulated in the buffer, but only the specified frames are displayed to the screen.
2. IGNORE - This is the opposite effect of SELECT. Displays everything except the specified frame types.

Section 3: Capture Control: Two lines are available for capture control options. You can specify how many STOP triggers before the monitoring is halted. Once the trigger count is reached, you can specify how many

additional characters (or frames) to be placed into the buffer (+ X number of Frames). Lastly, you can let the buffer wrap around several times or stop once the buffer is full.

Trigger operation will only occur after performing 3 steps:

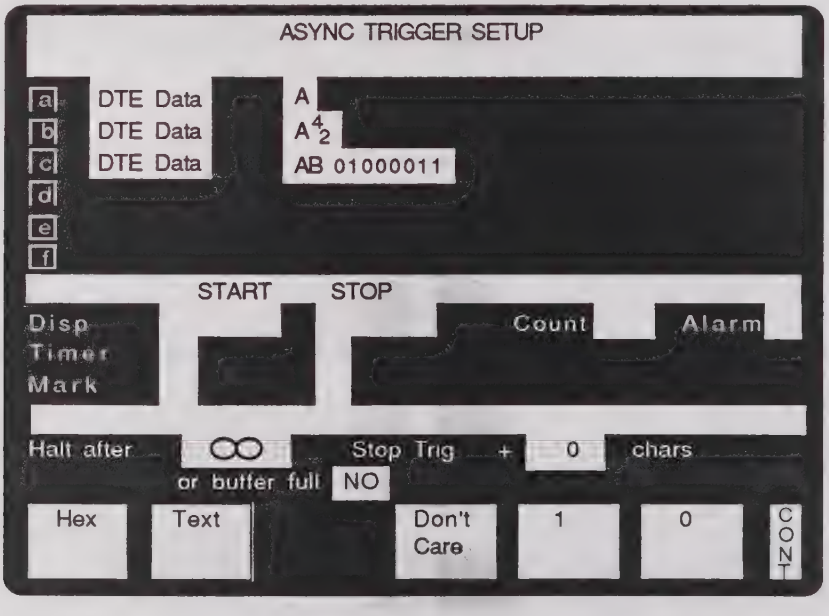
1. Define the event(s) at the top of the page.
2. Fill in the ACTION field(s) in the middle of the page.
3. In the RUN mode, select MONITOR LINE-TRIG or MON BUFFER-TRIG

Later, in the EXAM Buffer mode the Trigger events can also be used for the SEARCH function, which allows for quick finding of the desired event.

TRIGGER EVENT TYPES
5.1.1 DTE & DCE DATA TRIGGER

This trigger will operate on any bit pattern up to 16 bytes long. Each byte can be entered in ASCII, Hex, Binary, or with Don't Care bytes. DON'T CARE bits can be inserted within the data pattern to make it less specific to cover a variety of data patterns.

APPLICATION
Objective: Different methods of defining a Data Trigger
The figure below is an example of data patterns using A, AB, & ABC for the DTE side. The first line, Event A, has only one TEXT character entry. The second line, Event B, is using one TEXT character and one HEX character for a pattern. The third line, Event C, is using two TEXT characters and one BINARY pattern for a trigger. This shows a mixture of three different entries called TEXT, HEX and BINARY in the figure below.



In the binary entry mode, not only can the one or zero bits be entered but also DON'T CARE bits. This introduces two new symbols on the 841A's screen.

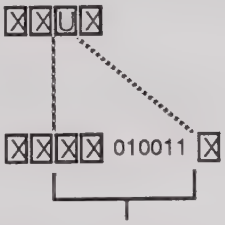
= A don't care bit (or byte)

= A byte with one or more don't care bits

You will see these symbols in some of the special X.25, SDLC or SS#7 trigger patterns for frame or packet types.

Each special pattern is made up of DON'T CARE bytes and DON'T CARE bits that will mask the field bits to define this frame. If you move the flashing cursor onto a symbol box with a "U" in it, you can expand the bit pattern for that byte by pressing the softkey for [BINARY]. In a half intensity field, you will see the bits (1 or 0) and the DON'T CARE bits (X) displayed. You can alter any of these bits to make a new trigger pattern.

A single "U" symbol will expand out to 8 bits



This example has 2 don't care bits and 6 binary bits.

5.1.2 LEAD CHANGE TRIGGER

The 841A is equipped to monitor five handshaking lines and one external input line. Each of these inputs can be selected as a positive or negative going transition. The trigger works only on the transition of the line, NOT its logical state.

The softkey for LEAD CHANGE will give a selection such as "RTS goes ON or OFF". The ON selection will produce a trigger on the signal transition going to a more positive voltage. (On the RS-232 interface, you need greater than +3 volts [spacing] to trip the trigger.) The OFF selection will produce a trigger on the signal transition going to a more negative voltage. (On the RS-232 interface, you need less than -3 volts [marking] to trip the trigger).

Handshaking lines:

Signal	(Ckt)	Signal name	RS-232	V.35	RS-449	X.21
RTS	(105)	Request-to-Send	pin 4	pin C	pins 7,25	pins 3,10
CTS	(106)	Clear-to-Send	pin 5	pin D	pins 9,27	-
DSR	(107)	Data-Set-Ready	pin 6	pin E	pins 11,29	-
DCD	(109)	Data-Carrier-Det.	pin 8	pin F	pins 13,31	pins 5,12
DTR	(108)	Data-Term-Ready	pin 20	pin H	pins 12,30	-
Ext. IN		External input	Only RS-232	-	-	

Ext. IN is for triggering on a line that the 841A is not normally monitoring, such as RI (Ring Indicator) pin 22, or SQ (Signal Quality) pin 21, etc. To do this, you must run a wire from this signal on the break-out panel over to the Ext. IN socket on the panel.

5.1.3 DTE & DCE ERROR TRIGGER

This trigger is to search for data errors like:

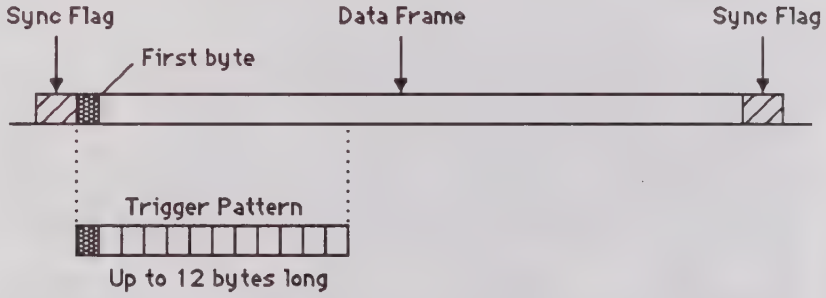
Type	Comment	Protocol Set
Parity error	Odd or even parity bit is not correct	ASYNC,BISYNC,SYNC
BCC error	Check code is not correct	ASYNC,BISYNC,SYNC
Framing error	Similar to Overrun error	SYNC
[S] Short frame error	Frame smaller than expected for this protocol	X.25,SDLC,SS#7
[L] Long frame error	Frame larger than size selected on Config Setup	X.25,SDLC,SS#7
[C] CRC error	Check code is not correct	X.25,SDLC,SS#7
Any error	Any of the above errors	ALL sets

5.1.4 TIME-OUT TRIGGER

The time-out trigger is used to halt the monitoring after a fixed time interval. This trigger can only be used while monitoring data. The time-out duration can be from 1 to 9999 seconds.

5.1.5 PROTOCOL FIELD TRIGGER

A trigger can be set for the special frame types in the X.25, SDLC and SS#7 protocols. The softkey selections create a special pattern of DON'T CARE bits (masked bits) to configure itself for specific frame codes. This special pattern is aligned with the front of the frame and can be up to 12 bytes long.



X.25

Special X.25 frames covered by the 841A trigger are:

INFO, RR, RNR, REJ, SABM, DISC, DM, UA, FRMR/CMDR, SABME, SARM, USER DEF

and packets:

CALL REQ, CALL ACCEPT, CLEAR REQUEST, CLEAR CONFIRM, DATA, INTERRUPT, RR, RNR, REJ, INTERRUPT CONFIRM, RESET, RESET CONFIRM, RESTART REQ, RESTART CONFIRM, REGIST REQ, USER DEFINE, LCI.

SDLC

Special SDLC frames covered:

INFO, RR, RNR, REJ, SNRM, DISC/RD, DM, UA, UI, RIM/SIM, BCN, CFGR, XID, UP, TEST, FRMR/CMDR, USER DEF

SNA

Special SNA frames covered by the 841A trigger are:

TH -FID 0 to FID 4, FID F

RH -REQ NC, REQ SC, REQ DFC, REQ FMD, RSP SC, RSP FMD, REQ SENSE, RSP SENSE, RTI +, RTI -, PACING INDIC

RU -NC, SC, DFC, FMDNSc, FMDNSma, FMDNSmn, FMDNSs, SENSE

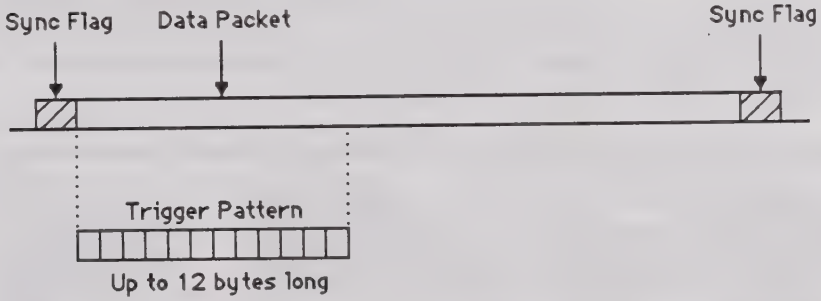
SS#7
For SS#7, the softkeys also provide a special pattern of DON'T CARE bytes and masked bytes to match specific MSU codes. Some special SS#7 MSUs covered in 841A trigger are:

FISU's (Fill Indicator Signalling Units)
LSSU's (Link Status Signalling Units) Out of Align, Normal Align, Emerg Align, Out of Serv, Process Outage, Busy
MSU's (Message Signalling Units)
DPC and OPC numbers
SIO types: Mgmt Msg, Test&Maint, SLTM, SCCP, TUP, ISDN, DUP Call, DUP Facil, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111

ANY of these frame trigger patterns can be altered for any special case through the softkeys on the 841A.

5.1.6 DTE & DCE PACKET TRIGGER

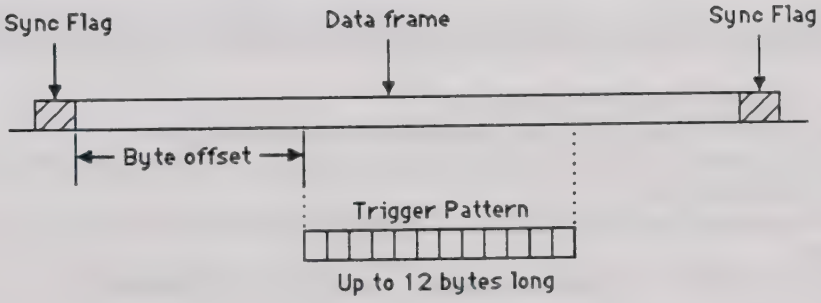
Triggers can be set for the special data packets in X.25 protocol. The softkey selections create a special pattern of DON'T CARE bits to configure itself for specific packet codes. This special pattern is aligned with the front of the data packet and can be up to 12 bytes long.



See sections 5.3 for a list of the X.25 triggers, 5.4 for SDLC/SNA Triggers and 5.6 for SS#7 Triggers.

5.1.7 DTE & DCE OFFSET TRIGGER

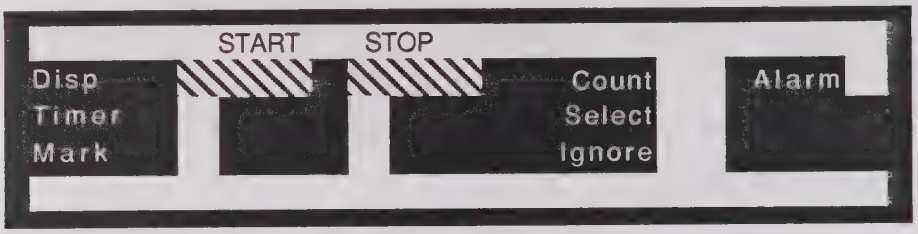
When you have to go further into the frame than the first twelve bytes, there is another trigger available named OFFSET POSITION. For X.25, SDLC/SNA and SS#7, this softkey selection will allow you to specify a byte location within the frame, then prompt you to define the character pattern. The OFFSET POSITION can be defined for any byte location up to 999 bytes deep into the frame. The first byte of a frame after the opening Flag is offset position zero (0).



With the DON'T CARE bits and 12 bytes of pattern matching, you can search for ANY special condition within a frame.

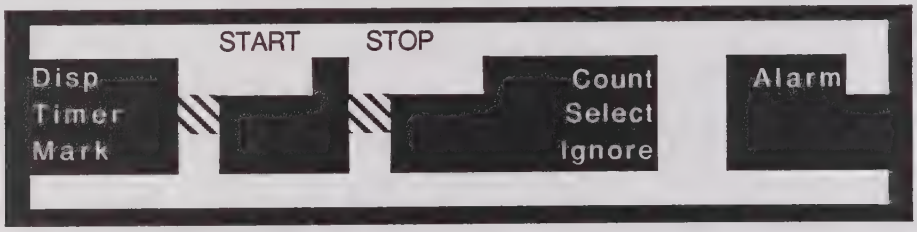
5.1.8 START-STOP DISPLAY

A trigger event can be used to start (or stop) the display of communication data. This is useful when you are interested in seeing specific data rather than having the screen continually overwriting with less important information. Any or ALL of the six events (a through f) can be used as an action for the display start-stop. To set this trigger, fill in the fields under START and STOP for the line labeled "DISP".

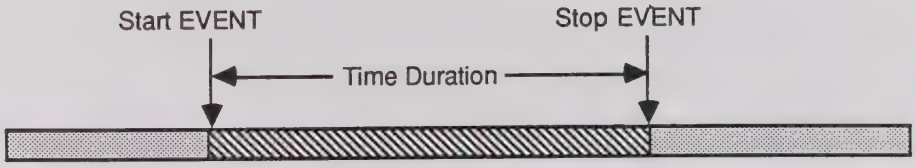


5.1.9 TIMER MEASUREMENT

The 841A is equipped with a real-time clock for measuring to 1 millisecond resolution. The timer Trigger can be used to measure the duration of communication data (or EIA signal change) per a user-defined event or can be used in conjunction with the Statistics Counters to perform "Time-Out and Stop" measurements. To set the timer, fill in the fields under the START and STOP columns for the line labeled "Timer".



The measured time values are displayed in HOURS, MINUTES, SECONDS, MILLISECONDS (12:35:52:01). When monitoring from the line (RUN MODE) with trigger, the Timer/Counter page is available as a softkey selection so that you can observe the resulting time duration.

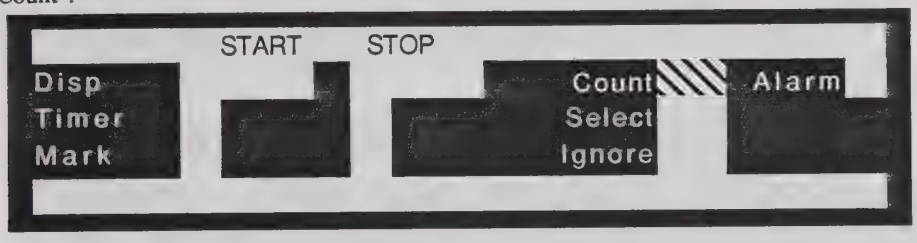


Examples of events that can be measured with the timer:

1. Time from an EIA handshake line change to the first data character being sent.
2. In half duplex operations, the Turn -Around time between when the DTE sends out a character to when the DCE sends it back.
3. Transmitter turn around for ASYNC, the time between two characters being sent to view the idle time.
4. In SS#7, the time it takes to go back into alignment from LSSU "Out of Alignment".

5.1.10 COUNTER MEASUREMENTS

The 841A is equipped with three software counters. The COUNTER trigger can be used to increment on communication data (or EIA signal change) per a user-defined event. To set this trigger fill in the fields after the line labeled "Count".



The counters 1 through 3 are incremented for the event letter in the order that they are entered into the field. Therefore, if the count events are B,A,E then counter 1 will increment for B, counter 2 for A and counter 3 for event E.

Example of events you can count:

1. The number of DTE errors that are in the buffer.
2. In X.25, the number of FRMR's.
3. Enable Statistics Counters for a specified Logical Channel Indicator number (X.25 only).

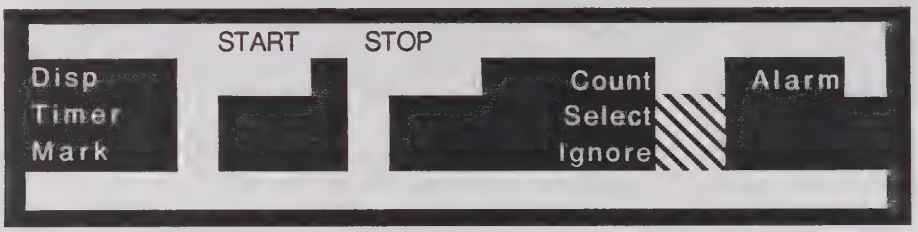
5.1.11 MARKING DATA

The 841A is equipped with the ability to MARK incoming data so it will be highlighted differently from all other data on the screen. The mark trigger can ONLY be used online to flag communication data (or EIA signal change) per a user-defined event. To set this trigger fill in the fields under the START and STOP after the labeled "MARK".

Marking can also be performed manually during the RUN MODE. If the data is 64K bps, then it becomes more desirable to use the trigger to mark the data since it is faster than your eye-hand coordination.

5.1.12 SELECT OR IGNORE FRAMES

This trigger can be used as a "filter" in analyzing data frames. The trigger page has two action fields named "SELECT" and "IGNORE". You can define up to six events to trigger on special frames (or packets) and place these events into the select or ignore fields on the trigger page. These fields are ONLY for frame events and only come up in BOP trigger pages like X.25, SDLC, and SS#7. SELECT will display only those events where IGNORE will display everything except those events.

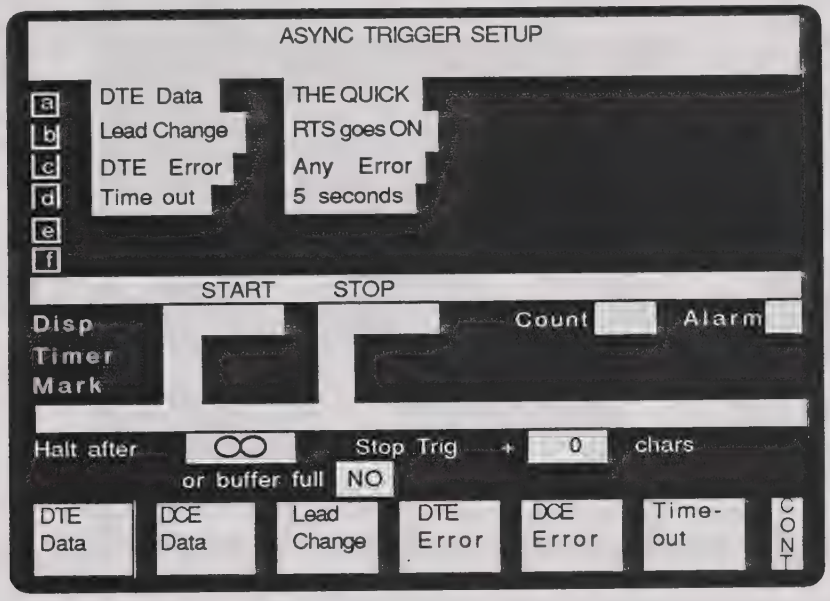


Therefore, selecting trigger in the RUN MODE with SELECT and IGNORE fields defined will filter the frames you will see on the screen but will leave them in the buffer for re-monitor. You can have up to six different event triggers in the SELECT or IGNORE fields.

NOTE 1: You cannot enter the same event into both the SELECT and IGNORE fields.
NOTE 2: In X.25, when selecting RUN mode with LCI, SELECT and IGNORE can only be used when the LCI is NOT entered in the COUNT field.

5.2 ASYNC, BISYNC, SYNC, IPARS and DDCMP TRIGGER SET

Asynchronous, Bisynchronous, Synchronous, IPARS and DDCMP protocols fall in the category of Character-Oriented Protocols (COP). The COP TRIGGER page will allow the user to select data, EIA lead changes, data errors, or a time-out as a trigger event. The Trigger Setup page appears as follows:



In the above example, we have entered one of each of the main trigger types:

a. DTE (or DCE) data pattern trigger
b. Lead change of RTS, CTS, DCD, DTR, DSR, Ext. IN as a trigger
c. DTE (or DCE) error condition
d. Stop monitoring after a Time-out

DTE & DCE Data trigger
See section 5.1.1 for more information.

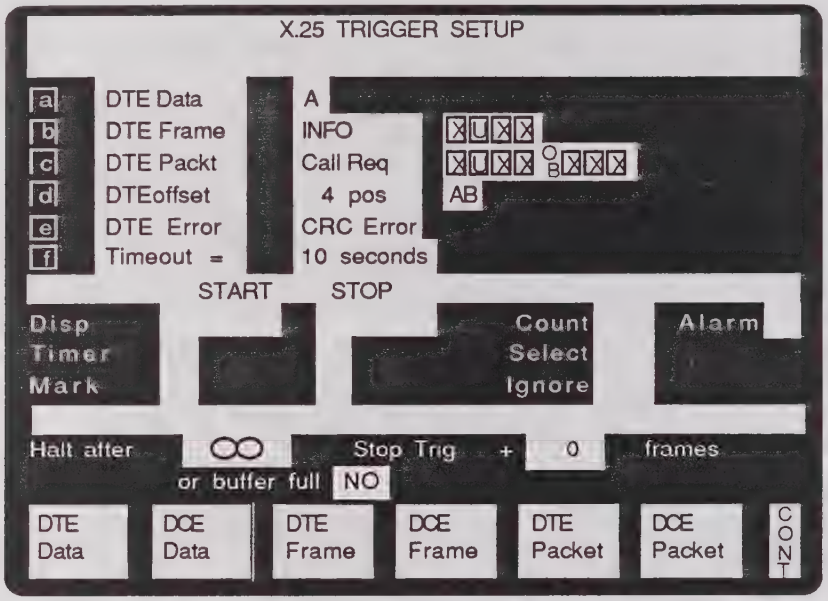
Lead change trigger
See section 5.1.2 for more information.

DTE & DCE Error trigger
See section 5.1.3 for more information.

Time-out trigger
See section 5.1.4 for more information.

5.3 HDLC/X.25 SET

This BOP trigger page will allow you to select data pattern, frame pattern, packet pattern, data errors, or a time-out as a trigger event. The X.25 Trigger Setup page appears as follows:



In the above X.25 figure, we have entered one of each of the main trigger types:

a. DTE (or DCE) data pattern trigger
b. DTE (or DCE) frame pattern trigger
c. DTE (or DCE) data packet portion of the frame trigger
d. DTE (or DCE) data pattern at some byte offset within the frame trigger
e. DTE (or DCE) error condition
f. Stop monitoring after a Time-out.

DTE & DCE Data trigger

See section 5.1.1 for more information.

Frame Pattern trigger

This Trigger Setup is just for the X.25 framing information. There are two keys for selecting DTE or DCE frames. This trigger will give an event for any of the following frame codes:

Softkey	Comment
INFO	Information field
RR	Receive Ready
RNR	Receive Not Ready
REJ	Reject command or response
DISC	Disconnect command
DM	Disconnect mode
UA	Un-numbered Acknowledge
FRMR/CMDR	Frame Reject
SABM	Set asynchronous balanced mode
SABME	Set asynchronous balanced mode extended
SARM	Set asynchronous response mode
USER DEF	User-defined frame

Any of these frame codes can be altered for a pattern up to 12 bytes long. See section 5.1.5 for more information.

Packet data trigger
This is a Trigger Setup just for X.25 packet information. There are two keys for selecting DTE & DCE packets. This trigger will give an event for any of the following packet types:

Softkey	Comment	Softkey	Comment
CALL REQ	Call Requested	RNR	Receive Not Ready
CALL ACCEPT	Call Accepted	REJ	Reject
CALL CONNCT	Call Connect	RESET INDIC	Reset Indication
CLEAR REQ	Clear Requested	RESET REQ	Reset Request
CLEAR INDIC	Clear Indication	RESET CONF	Reset Confirmation
CLEAR CONF	Clear Confirmed	RESTRT INDIC	Restart Indication
DATA	Data	RESTRT REQ	Restart Request
DIAG	Diagnostic	RESTRT CONF	Restart Confirmation
INC CALL	Incoming Call	REGIST REQ	Registration Request
INTERRUPT	Interrupt	REGIST CONF.	Registration Confirmation
INTRPT CONF	Interrupt Confirmation	USER DEF	User defined packet
RR	Receive Ready	LCI	Logical Channel Indicator

Any of these specific packet codes can be altered for a pattern up to 12 bytes long. See section 5.1.6 for more general information.

APPLICATION
Objective: Count Frame and Packet level activity for a specific Logical Channel Indicator (LCI).

Begin by selecting either DTE or DCE PACKET ([SK-5] or [SK-6]). Press the [CONT] key twice, or until you see the selection LCI.

After selecting LCI, the 841 prompts you to enter a 4-digit number. After entering the desired LCI number, move the cursor down to the COUNT field (near the middle of the display page), then enter the Event Reference letter.

NOTE: Do not enter the LCI number in the SELECT OR IGNORE fields. LCIs can only be entered into one Trigger field at a time.

Press the [MAIN] key, then [SK-3] for the RUN mode. Now select [SK-3] to monitor from the Line, or press [SK-6] to Re-Monitor the buffer contents.

When you then select the [STATS/COUNTER] softkey, you will see the counts for both the specific LCI under the DCE or DTE column and the total counts from the other side of the line.

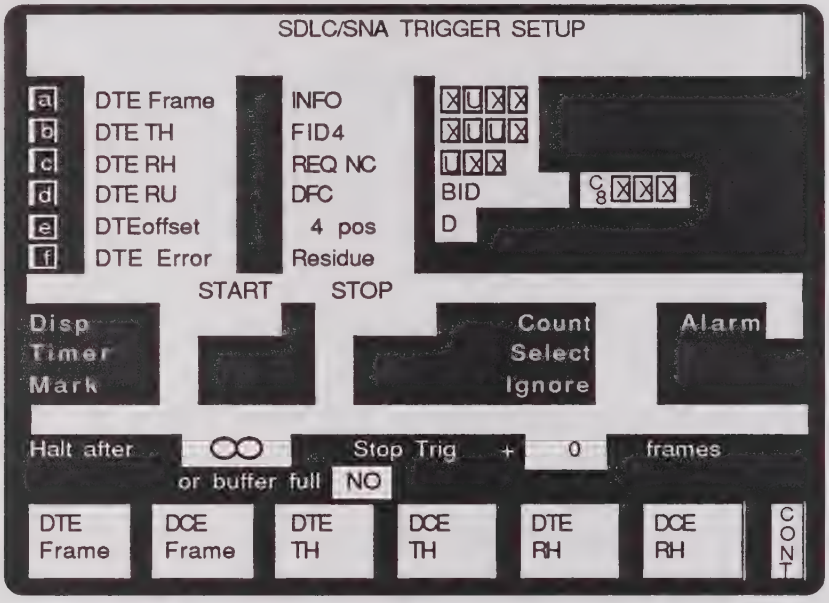
DTE & DCE offset trigger
See section 5.1.7 for more information.

DTE & DCE Error trigger
See section 5.1.3 for more information.

Time-out trigger
See section 5.1.4 for more information.

5.4 SDLC/SNA SET

This BOP trigger page will allow you to select data patterns, frame patterns, data errors, or a time-out as a trigger event. The SDLC/SNA Trigger Setup page appears as follows:



In the above SDLC page, we have entered each of the main types of triggers:

a. DTE (or DCE) frame pattern trigger
b. DTE (or DCE) data packet TH type trigger
c. DTE (or DCE) data packet RH type trigger
d. DTE (or DCE) data packet RU type trigger
* DTE (or DCE) data pattern trigger (Not shown)
e. DTE (or DCE) data pattern at some byte offset within the frame trigger
f. DTE (or DCE) error condition
* Stop monitoring after a Time-out. (Not shown)

Frame Pattern trigger

This trigger is set up for the SDLC framing information. There are two keys for selecting DTE & DCE frames. This trigger will give an event for any of the following frame codes:

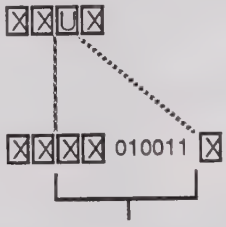
Softkey	Comment
INFO	Information field
RR	ReceiveReady
RNR	ReceiveNot Ready
REJ	Reject command or response
SNRM	Set normal response mode
DISC/RD	Disconnect command
DM	Disconnect mode
UA	Un-numbered Acknowledge
UI	Un-numbered information frame
RIM/SIM	Request Initialization mode/ Set Initialization mode
BCN	Beacon
CFGR	Configure
XID	Exchange station identification
UP	Un-numbered poll

Softkey (cont)	Comment (cont)
TEST	Test
FRMR/CMDR	Frame Reject
USER DEF	User-defined frame

Any of these specific frame codes can be altered for a pattern up to 12 bytes long.

Each special frame pattern is made up of DON'T CARE bytes and DON'T CARE bits that will mask the field bits to define this frame. If you move the flashing cursor onto a symbol box with a "U" in it, you can expand the bit pattern for that byte by pressing the softkey for BINARY. In a half-intensity field, you will see the bits (1 or 0) and the DON'T CARE bits (X) displayed. You can alter any of these bits to make a new trigger pattern.

A single "U" symbol will expand out to 8 bits



This example has 2 don't care bits and 6 binary bits.

TH (Transmit Header) Packet data trigger

This trigger is set up for the SNA packet information within the SDLC frame. There are two keys for selecting DTE & DCE packets. This trigger will give an event for any of the following packet types:

Softkey	Comment
FID 0	Format identification 0
FID 1	Format identification 1
FID 2	Format identification 2
FID 3	Format identification 3
FID 4	Format identification 4
FID F	Format identification F

Any of these specific packet codes can be altered for a pattern up to 12 bytes long.

RH (Request/Response Header) Packet data trigger

This trigger is set up for the SNA packet information within the SDLC frame. There are two keys for selecting DTE & DCE packets. This trigger will give an event for any of the following packet types:

Softkey	Comment
REQ NC	Request network control
REQ SC	Request session control
REQ DFC	Request Data flow control
REQ FMD	Request Function management data
RSP SC	Response Session control
RSP FMD	Response Function management data
REQ SENSE	Request sense data indicator
RSP SENSE	Response sense data indicator
RTI +	Response type indicator positive
RTI -	Response type indicator negative
PACING INDIC	Pacing indicator

Any of these specific packet codes can be altered for a pattern up to 12 bytes long.

RU (Request/Response Unit) Packet data trigger

This is a trigger set up just for the SDLC/SNA packet information. There are two keys for selecting DTE & DCE packets. Each of these RU types will become further broken down into more softkey selections. Any of these specific packet codes can be altered for a pattern up to 12 bytes long.

NC	**Network Control**
Sub-field softkey	Comment
LSA	Lost sub area
NC-ACTVR	Activator virtual routing
NC-DACTVR	Deactivator virtual routing
NC-ER-ACT	Explicit route activate
NC-ER-ACT-RPL	Explicit route activate reply
NC-ER-INOP	Explicit route inoperative
NC-ER-OP	Explicit route operative
NC-ER-TEST	Explicit route test
NC-ER-TR	Explicit route test reply
NC-IPL-ABORT	NC IPL Abort
NC-IPL-FINAL	NC IPL Final
NC-IPL-INIT	NC IPL Initial
NC-IPL-TEXT	NC IPL Text

SC	**Session Control**
Sub-field softkey	Comment
ACTCDRM	Activate cross-domain resource manager
ACTLU	Activate logical unit
ACTPU	Activate physical unit
BIND	Bind session
CLEAR	Clear
CRV	Cryptography verification
DACT CDRM	Deactivate cross-domain resource manager
DACTLU	Deactivate logical unit
DACTPU	Deactivate physical unit
RQR	Request recovery
SDT	Start data traffic
STSN	Set and test sequence number
UNBIND	Unbind session

DFC	**Data Flow Control**
Sub-field softkey	Comment
BID	Bid
BIS	Bracket initiation stopped
CANCEL	Cancel
CHASE	Chase
LUSTAT	Logical unit status
QC	Quiesce complete
QEC	Quiesce at end of chain
RELQ	Release quiesce
RTR	Ready to receive
RSHUTD	Request shutdown
SBI	Stop bracket initiation
SHUTC	Shutdown complete
SHUTD	Shutdown
SIG	Signal

FMDNSc **Function Management Data Network Services Configuration Services**

Sub-field softkey	Comment
ABCONN	Abandon connection
ABCONN OUT	Abandon connect out
ACT CONNIN	Abandon connect in
ACT LINK	Activate link
ADD LINK	Add link
ADD LINKST	Add link station
ANA	Assign network address
CONNOUT	Connect out
CONTACT	Contact
CONTACTED	Contacted
DACT CONNIN	Deactivate connect in
DACT LINK	Deactivate link
D CONTACT	Discontact
DELETE NR	Delete network resource
DUMP FINAL	Dump final
DUMP INIT	Dump initial
DUMP TEXT	Dump text
ER-INOP	Explicit route inoperative
ESLOW	Entering slowdown
EXSLOW	Exiting slowdown
FNA	Free network address
INIT-PROC	Initiate procedure
INOP	Inoperative
IPL-FINAL	IPL final
IPL-INIT	IPL initial
IPL-TEXT	IPL text
LCP	Lost control point
LDREQD	Load required
NS IPL ABORT	NS IPL Abort
NS IPL FINAL	NS IPL Final
NS IPL INIT	NS IPL Initialize
NS-IPL TEXT	NS IPL text
NS-LSA	NS lost sub area
PROC STAT	Procedure status
REQ ACT LU	Request activate logical unit
REQ CONT	Request contact
REQ DISCNT	Request discontact
REQ FNA	Request free network address
RNAA	Request network address assignment
RPO	Remote power off
SETCV	Set control vector
VR INOP	Virtual route inoperative

FMDNSma **Function Management Data Network Services Maintenance Services**

Sub-field softkey	Comment
ACT TRACE	Activate trace
DACT TRACE	Deactivate trace
DISP STOR	Display storage
ECHO TEST	Echo test

FMDNSma (cont)	**Function Management Data Network Services Maintenance Services** (cont)
ER-TESTED	Explicit route tested
EXEC TEST	Execute test
RECFMS	Record formatted maintenance statistics
RECMS	Record maintenance statistics
REC STOR	Record storage
REC TD	Record test data
REC TR	Record test results
RECTRD	Record trace data
REQ ECHO	Request echo test
REQ MS	Request maintenance statistics
REQ TEST	Request test procedure
ROUTE-TEST	Route test
SET CV	Set control vector
TEST MODE	Test mode

FMDNSmn	**Function Management Data Network Services Measurement Services**
Sub-field softkey	Comment
DELIVER	Deliver
FORWARD	Forward

FMDNSs	**Function Management Data Network Services Session Services**
Sub-field softkey	Comment
BIND F	Bind failure
CDC INIT	Cross domain control initiate
CD INIT	Cross domain initiate
CDSESS-END	Cross domain session end
CDSESS SF	Cross domain session startup failure
CDSESS ST	Cross domain session started
CDSESS TF	Cross domain session takedown failure
CD TAKED	Cross domain takedown
CD TAKEDC	Cross domain takedown complete
CD TERM	Cross domain terminate
CINIT	Control initiate
CLEAN UP	Cleanup session
C TERM	Control terminate
DSR LST	Direct search list
INIT-O-CD	Initiate other cross domain
INIT-OTHER	Initiate other
INIT-SELF0	Initiate self (format 0)
INIT-SELF1	Initiate self (format 1)
NOTIFY S>L	Notify (SSCP --> LU)
NOTIFY S>S	Notify (SSCP --> SSCP)
NSPE	NS procedure error
SESS END	Session ended
SESS ST	Session started
TERM OTHER	Terminate other
TERM OTHERCDE	Terminate other cross domain
TERM SELF0	Terminate self (format 0)
TERM SELF1	Terminate self (format 1)

UNBIND F	Unbind failure

SENSE	**Sense Data**
Sub-field softkey	Comment
USER-SENSE	User sense
REQST REJECT	Request reject
REQST ERROR	Request error
STATE ERROR	State error
RH USAGE	RH usage error
PATH ERROR	Path error

DTE & DCE Data trigger
See section 5.1.1 for more information.

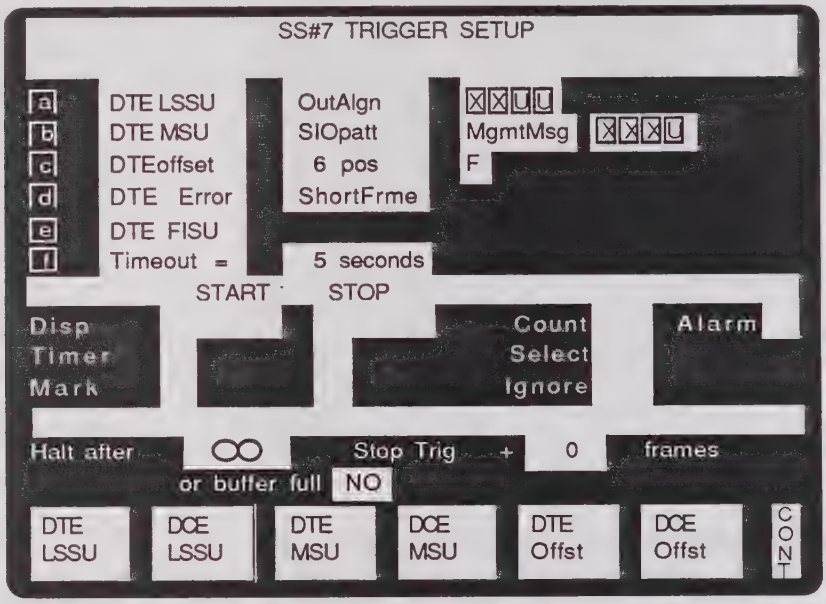
DTE & DCE offset trigger
See section 5.1.7 for more information.

DTE & DCE Error trigger
See section 5.1.3 for more information.

Time-out trigger
See section 5.1.4 for more information.

5.5 SS#7 SET

The SS#7 Trigger Setup page will allow you to select data patterns, LSSU's, MSU's, FISU's, data errors, or a time-out as a trigger event. The SS#7 Trigger Setup page appears as follows:



In the above SS#7 Trigger Setup, we have entered one of each of the major types of triggers:

a. DTE (or DCE) LSSU pattern trigger
b. DTE (or DCE) MSU pattern trigger
c. DTE (or DCE) data pattern at some byte offset within the frame trigger
d. DTE (or DCE) error condition
e. DTE (or DCE) FISU pattern trigger
* DTE (or DCE) data pattern trigger (Not shown, see sect 5.1.1)
f. Stop monitoring after a Time-out.

LSSU Trigger Patterns:

Softkey	Comment
Outof Align	Out of Alignment
Normal Align	Normal Alignment
Emerg Align	Emergency Alignment
Out of Servce	Out of Service
Process Outage	Processor Outage
Busy	Busy
User Defined	Define any pattern up to 4 bytes long.

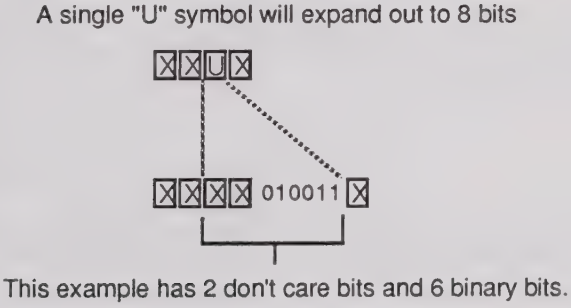
Any of these specific LSSU codes can be altered for a pattern up to 12 bytes long.

MSU Trigger Patterns:
If SIO is selected, two options will be displayed, SIO PATTERN and SIO PAGE. [SIO PATTERN] will present eight MSU types as follows:

Softkey	Comment
Mgmt Msg	Management Messages
Test& Maint	Testing & Maintenance message
SLTM	Service Link Test Message
SCCP	Signalling Connection Control Part
TUP	Telephone User Part
ISDN	ISDN User Part
DUP Call	Data User Part Call
DUP Facil	Data User Part Facility
User Define	Define any pattern up to 4 bytes long.

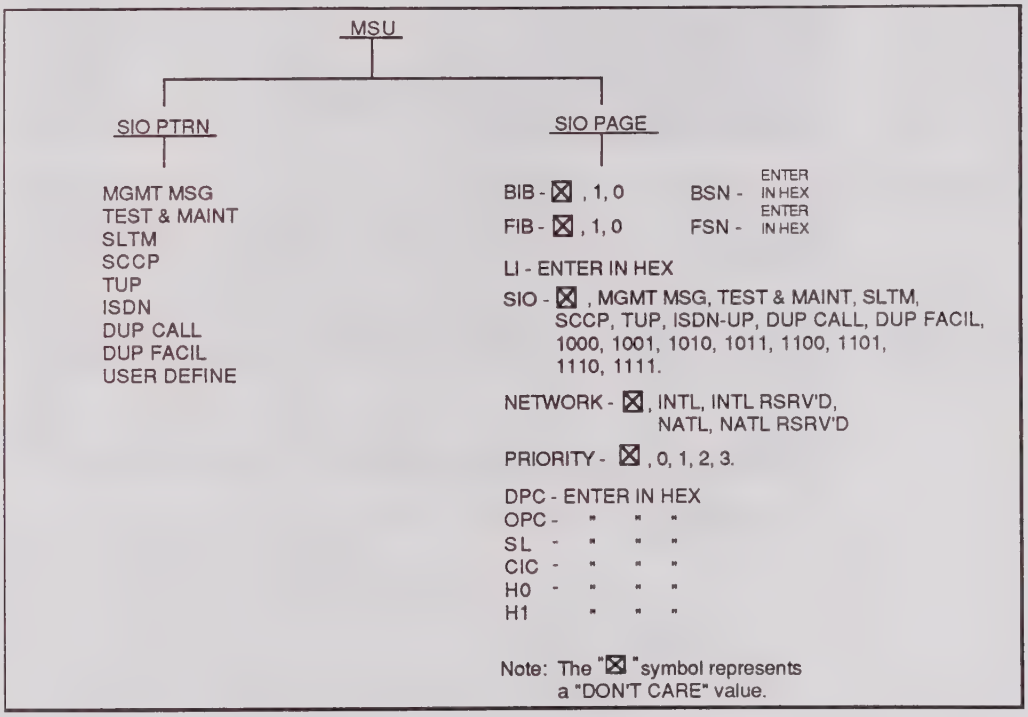
Any of these specific MSU codes can be altered for a pattern up to 12 bytes long.

Each frame pattern is made up of DON'T CARE bytes and DON'T CARE bits that will mask the field bits to define the frame. By moving the flashing cursor onto a symbol box with a "U" in it, you can expand the bit pattern for that byte by pressing the softkey for [BINARY]. In a half intensity field, you will see the bits (1 or 0) and the DON'T CARE bits (X) displayed. You can alter any of these bits to make a new trigger pattern.



If [SIO PAGE] is selected, a global frame pattern will be presented to the screen, where each bit field in the MSU (up to H0/H1) can be set for the most specific MSU trigger event.

Field	Enter	Field	Enter
BIB, FIB	1, 0 , Don't Care	BSN, FSN	Hex value, Don't Care
LI	Hex value, Don't Care	SIO	SIO type
Network	Network type or Don't Care	Priority	0, 1, 2, 3, Don't Care
DPC	Hex value, Don't Care	OPC	Hex value, Don't Care
HO	Hex value, Don't Care	SL	Hex value, Don't Care
H1	Hex value, Don't Care	CIC	Hex value, Don't Care


MSU
SIO PTRN
MGMT MSG
TEST & MAINT
SLTM
SCCP
TUP
ISDN
DUP CALL
DUP FACIL
USER DEFINE
SIO PAGE
BIB - ☒ , 1, 0
BSN - ENTER IN HEX
FIB - ☒ , 1, 0
FSN - ENTER IN HEX
LI - ENTER IN HEX
SIO - ☒ , MGMT MSG, TEST & MAINT, SLTM, SCCP, TUP, ISDN-UP, DUP CALL, DUP FACIL, 1000, 1001, 1010, 1011, 1100, 1101, 1110, 1111.
NETWORK - ☒ , INTL, INTL RSRV'D, NATL, NATL RSRV'D
PRIORITY - ☒ , 0, 1, 2, 3.
DPC - ENTER IN HEX
OPC - " " "
SL - " " "
CIC - " " "
H0 - " " "
H1 " " "
Note: The "☒ "symbol represents a "DON'T CARE" value.

DTE & DCE Data trigger
See section 5.1.1 for more informatiбn.

DTE & DCE position trigger
See section 5.1.7 for more information.

DTE & DCE Error trigger
See section 5.1.3 for more information.

FISU Pattern trigger
This is a trigger set up just for the special SS#7 Fill In Signalling Unit. This trigger will operate on any FISU where the field LI is set to zero. If the LI field is greater than zero, then the SU is an LSSU or MSU type.

Time-out trigger
See section 5.1.4 for more information.

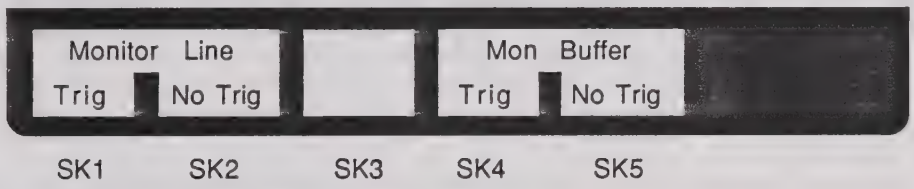
Lead Change trigger
See Section 5.1.2 for more information.

Running

6.0 RUNNING

The 841A is equipped with two methods of monitoring. Information can be monitored from the data interface in real-time, or remonitored from the buffer after it has been captured. In either case, you can select to monitor with or without user-selectable triggers. Two additional "special" softkey selections are available, one for the Character-Oriented protocols titled FAST, and the other for X.25, titled LCI. FAST is used for full duplex operation to maximize display throughput. LCI is used to monitor a specified LCI number for Statistics Counting, or Selecting or Ignoring.

After selecting [RUN] from the MAIN menu, selecting MONITOR mode will cause the screen to change and display the message "WAIT FOR DATA" until the first frame or character enters the buffer.



The top two header lines on the screen change to match the protocol selected earlier in the CONFIG SETUP page. Each of the protocols has a unique header line to indicate any special fields. See section 7.1 for more details.

6.1 MONITOR LINE WITH TRIGGER [SK-1]

In this mode, data is collected into the capture buffer and the TRIGGER is active for display and analysis purposes. The softkey selection is labeled MONITOR LINE - TRIG [SK-1]. The communication protocol that is displayed must be previously set in the CONFIG page. If you see no data, recheck the PROTOCOL and the BITS/SEC parameters in the CONFIG page.

6.2 MONITOR LINE WITH NO TRIGGER [SK-2]

In this mode, data is collected into the capture buffer withs NO TRIGGER active. The softkey selection is labeled MONITOR LINE - NO TRIG [SK-2]. The communication protocol that is displayed must be previously set in the CONFIG page. If you see no data, recheck the PROTOCOL and the BITS/SEC parameters in the CONFIG page.

6.3 RE-MONITOR BUFFER WITH TRIGGER [SK-4]

In this mode, data is read from the capture buffer, and the TRIGGER is active for display and analysis purposes. The softkey selection is labeled MON BUFFER - TRIG [SK-4]. The communication protocol that was last catpured from the interface into memory will be displayed no matter what protocol was set in the CONFIG page. Trigger events may be re-defined and re-run without altering the contents of the capture buffer.

6.4 RE-MONITOR BUFFER WITH NO TRIGGER [SK-5]

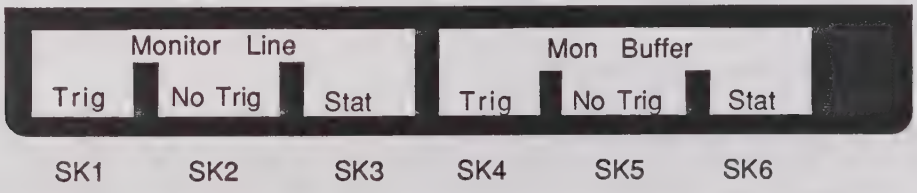
In this mode, data is read from the capture buffer and with NO TRIGGER active. The softkey selection is labeled MON BUFFER - NO TRIG [SK-5]. The communication protocol that was last catpured from the interface into memory will be displayed no matter what protocol was set in the CONFIG page.

6.5 MONITOR LINE FAST (COP ONLY) [SK-3]

In this mode, data is collected into the capture buffer with NO TRIGGER active. The softkey selection is labeled MON - FAST [SK-3]. This softkey is only shown in Async, Bisync, Sync, IPARS or DDCMP protocols as selected in the CONFIG page. The mode was created to maximize the screen throughput for COP communication above 19.2 K bps in full duplex. Monitoring is placed into the TIME-MUX display mode and display format changes while running are disabled. If you see no data, recheck the PROTOCOL and the BITS/SEC in the CONFIG page.

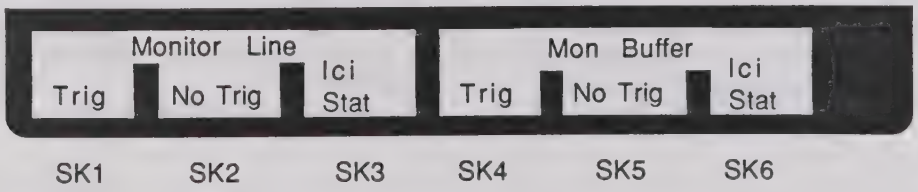
6.6 STAT (STATISTICS) [SK-3] or [SK-6]

This softkey selection is available for SDLC and SS#7 protocols, and provides automatic counters for level 2 and level 3 (SS#7 only) protocol activities. Separate counters are provided for both sides of the communication line. In SDLC the counters monitor activities such as SNRM, UA, DISC, DM, FRMR, INFO and XID. In SS#7 the counters are set for activities such as FISU's, LSSU's (further broken down to Out of Alignment, Normal Alignment, Emergency Alignment, Out of Service and so on) and MSU's such as Network Management, Network Test and Maintenance, SCCP and so on). In addition to the protocol activities, Total Frames, CRC Errors and Errored Frames are counted. SS#7 also includes line utilization statistics in the form of MSU LOADING PERCENTAGE. This indicates the amount of time (in percentage) that Message Signalling Units are in the data stream of the line under test.



6.7 LCI STATISTICS (Logical Channel Indicator, X.25 only) [SK-3] or [SK-6]

This selection allows you to make specific (4 digit) Logical Channel Indicator (number) Frame and Packet statistical counts. After defining a DTE or DCE PACKET LCI on the TRIGGER SETUP page, selecting the [LCI] softkey in the RUN mode will direct the 841 to count the activity for that LCI ONLY . The counts made for the opposite (undefined) side of the line will be a total of all LCI's on that side. If no LCI's are defined, then the 841 will count all activity on both sides of the line.



6.8 FREEZE/RESUME [SK-1]

The display of the data being captured can be stopped and started with the FREEZE - RESUME [SK1] softkey during run-time. Communication data will still accumulate into the memory buffer, but the screen display can be "frozen". Any user triggers will still be operational even through the screen is in a FREEZE mode, so if you have picked ALARM on the trigger page, it will still beep.

This function is helpful when monitoring lines running at 48K to 64K bps. The screen will be changing very rapidly, and it may be difficult to read some data traffic without stopping the screen once in a while.

6.9 TIMER/COUNTER [SK-2]

This feature is used in conjuction with the TRIGGER mode during monitoring. During run time, the 841A can be set up to count events and measure the time duration between two events. The TIMER/COUNTER selection will allow you to switch screens during the run time to observe the values of the timer and counters. Each time you select the TIMER/COUNTER screen, the latest accummulated totals will be displayed. This function will not prevent the capturing of data while the TIMER/COUNTER page is being displayed on the screen.

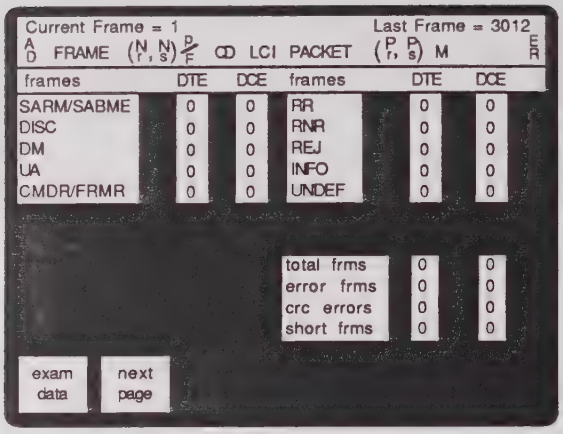
6.10 STATS/COUNTER [SK-2]

This selection provides automatic Frame level and Packet level (X.25, SDLC and SS#7) statistical counters for both the DTE and DCE sides of the communications line. When monitoring "live" data, the counters are updated in real-time. When re-monitoring the capture buffer in SDLC/SNA and X.25, the counters display the values up to the point at which the statistics counters were accessed. In SS#7, when "re-monitoring" the capture buffer, the counters are updated in the same fashion as when monitoring from the line under test, and displays the current frame number across the top of the screen.

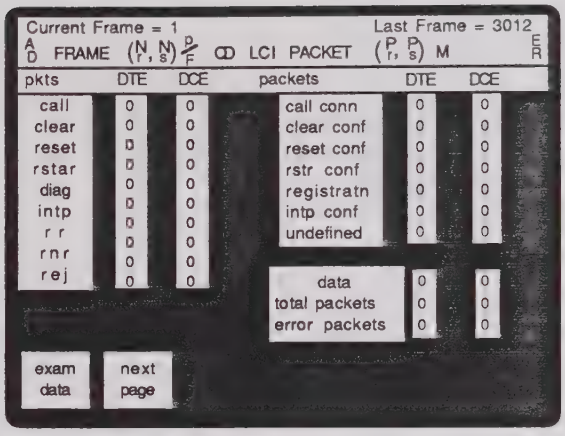
To access the Statistical Counters in the RUN mode, select MON - LINE STAT [SK-3], or MON - BUFR STAT [SK-6]. Additional counters can then be viewed in real-time by pressing the STAT/CNTRS softkey [SK-2]. Currently, X.25 provides two screens, SDLC provides one screen, and SS#7 has three screens. Press SK2 (Stat) to access each screen. In SS#7 real time statistics mode, normal frame decoding mode is not available due to real time consideration. Additional counters are provided for TOTAL FRAMES, ERRORED FRAMES, CRC ERRORS, and SHORT FRAMES. For X.25, the level 3 protocol counters also include the number of DATA PACKETS, TOTAL PACKETS, and ERRORED PACKETS.

"Time-Out and Stop" operations can be performed by defining the desired TIMEOUT duration on the Trigger Setup page, then set into the STOP DISPLAY field. This can allow for making statistical counts for a given time period (ref. sect. 5.1.9).

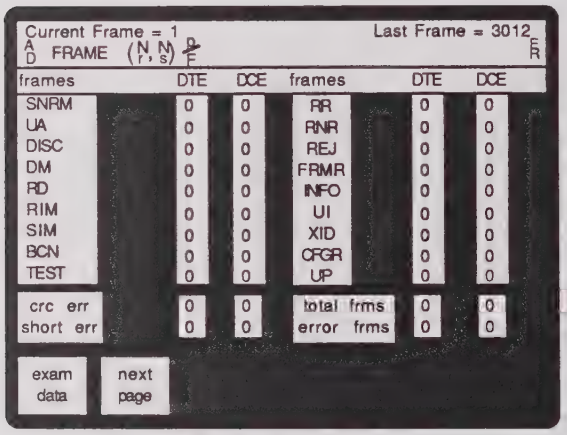
NOTE: For SDLC/SNA and X.25, each counter can contain up to 65,535 counts. When monitoring an SS#7 communicaton line, each of the counters will record up to a maximum of 4 billion counts. Be aware that if the capture buffer was set for "Continuous" or wrap-around (refer to section 5.1), attempting to locate a specific event may be unsuccessful. This occurs because the buffer had wrapped-around, discarding the oldest data and replacing it with the most current data.


Current Frame = 1
Last Frame = 3012
A D FRAME (N r, N s) P F CD LCI PACKET (P r, P s) M E R
frames DTE DCE frames DTE DCE
SARM/SABME 0 0 RR 0 0
DISC 0 0 RNR 0 0
DM 0 0 REJ 0 0
UA 0 0 INFO 0 0
CMDR/FRMR 0 0 UNDEF 0 0
total frms 0 0
error frms 0 0
crc errors 0 0
short frms 0 0
exam data
next page

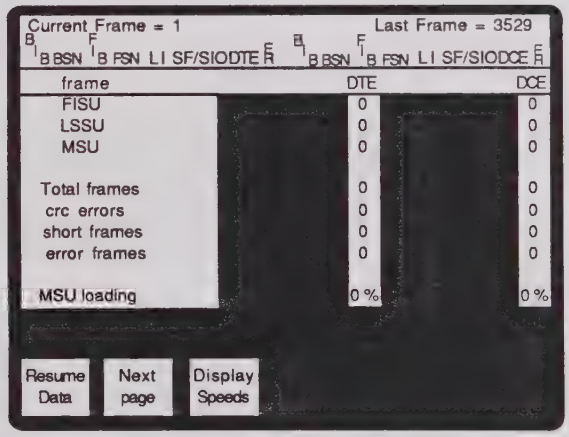
X.25 FRAME STATISTICS


Current Frame = 1
Last Frame = 3012
A D FRAME (N r, N s) P F CD LCI PACKET (P r, P s) M E R
pkts DTE DCE packets DTE DCE
call 0 0 call conn 0 0
clear 0 0 clear conf 0 0
reset 0 0 reset conf 0 0
rstar 0 0 rstr conf 0 0
diag 0 0 registratn 0 0
intp 0 0 intp conf 0 0
r r 0 0 undefined 0 0
rnr 0 0
rej 0 0
data 0 0
total packets 0 0
error packets 0 0
exam data
next page

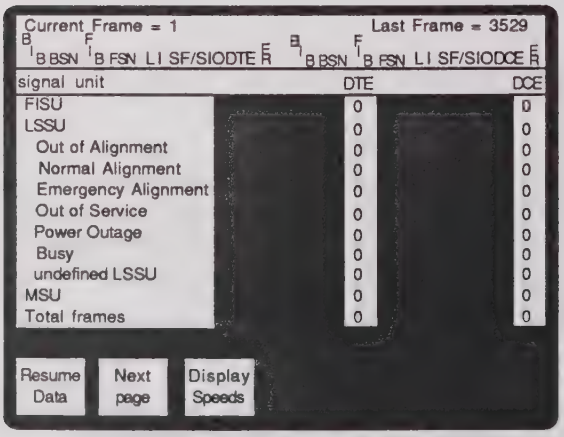
X.25 PACKET STATISTICS


Current Frame = 1
Last Frame = 3012
A D FRAME (N r, N s) P F E R
frames DTE DCE frames DTE DCE
SNRM 0 0 RR 0 0
UA 0 0 RNR 0 0
DISC 0 0 REJ 0 0
DM 0 0 FRMR 0 0
RD 0 0 INFO 0 0
RIM 0 0 UI 0 0
SIM 0 0 XID 0 0
BCN 0 0 CFGR 0 0
TEST 0 0 UP 0 0
crc err 0 0 total frms 0 0
short err 0 0 error frms 0 0
exam data
next page

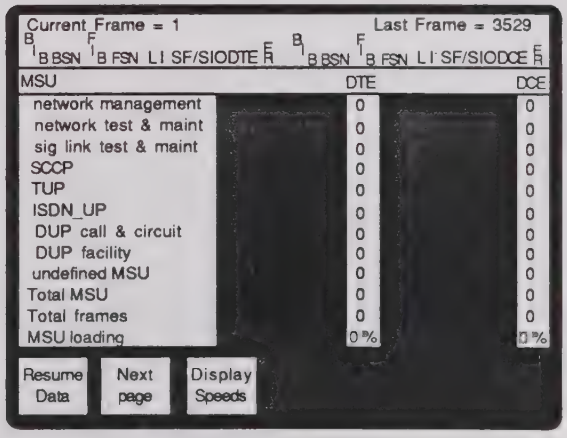
SDLC FRAME STATISTICS


Current Frame = 1
Last Frame = 3529
B I B BSN F B FSN LI SF/SIODTE E R B I B BSN F B FSN LI SF/SIODCE E R
frame DTE DCE
FISU 0 0
LSSU 0 0
MSU 0 0
Total frames 0 0
crc errors 0 0
short frames 0 0
error frames 0 0
MSU loading 0 % 0 %
Resume Data
Next page
Display Speeds

SS#7 - SUMMARY STATISTICS


Current Frame = 1
Last Frame = 3529
B I B BSN F B FSN LI SF/SIODTE E R B I B BSN F B FSN LI SF/SIODCE E R
signal unit DTE DCE
FISU 0 0
LSSU 0 0
Out of Alignment 0 0
Normal Alignment 0 0
Emergency Alignment 0 0
Out of Service 0 0
Power Outage 0 0
Busy 0 0
undefined LSSU 0 0
MSU 0 0
Total frames 0 0
Resume Data
Next page
Display Speeds

SS#7 - LSSU STATISTICS


Current Frame = 1
Last Frame = 3529
B I B BSN F B FSN LI SF/SIODTE E R B I B BSN F B FSN LI SF/SIODCE E R
MSU DTE DCE
network management 0 0
network test & maint 0 0
sig link test & maint 0 0
SCCP 0 0
TUP 0 0
ISDN_UP 0 0
DUP call & circuit 0 0
DUP facility 0 0
undefined MSU 0 0
Total MSU 0 0
Total frames 0 0
MSU loading 0 % 0 %
Resume Data
Next page
Display Speeds

SS#7 - MSU STATISTICS

NOTE: See section 5.3 for X.25 LCI triggering.

6.11 MARKING DATA [SK-3]

This feature is used to manually (or automatically with trigger) "mark" the incoming data with a special video intensity (or color) for quick reference later during EXAMINE BUFFER or RE-MONITOR. This function can ONLY be operated during MONITOR LINE selections. The softkey is titled MARK DATA [SK-3].

6.12 TEXT/HEX [SK-4]

For all protocols, the data can be presented in its text code (ASCII, EBCDIC, EBCD, IPARS or Decoded ENGLISH) fields by the CONFIG SETUP selections. At times it is desirable to see the information in HEX format to see each of the associated bits within the byte captured. The TEXT - HEX [SK-4] softkey is for switching the display over to hex format during run mode (or examine buffer).

6.13 DISPLAY FORMATS [SK-5]

There are many display formats available for each protocol select. COP data like Async, Bisync, Sync, IPARS and DDCMP share five different display formats. For each type of BOP data, special display formats have been created to better decode fields unique to that protocol.

ASYNC, BISYNC, SYNC Formats:

Line Mux with PAD	Line Mux with EIA
DTE only	DCE only
Time Mux	

X.25 Formats:

X.25 Summary or X.25 Detailed, QLLC Summary, QLLC Detailed or Line Mux with EIA

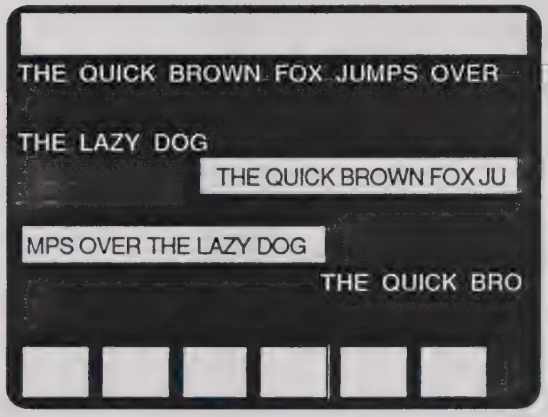
SDLC/SNA Formats:

SDLC Summary or SDLC Detailed, SNA Summary, SNA Detailed or Line Mux with EIA

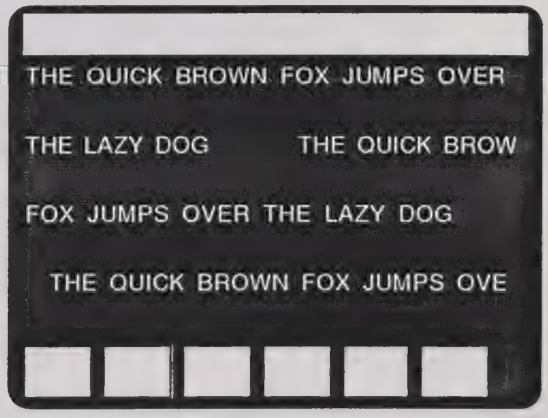
SS#7 Formats:

SS#7 Summary, SS#7 Detailed, or SS#7 Split screen.

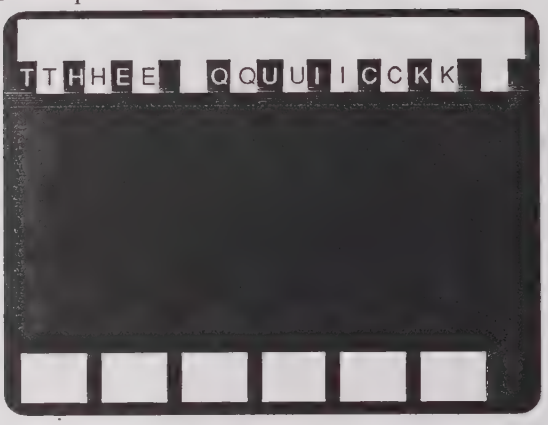
During run time, the Display Format DETAILED (for B.O.P. frames) does not display the time stamp.



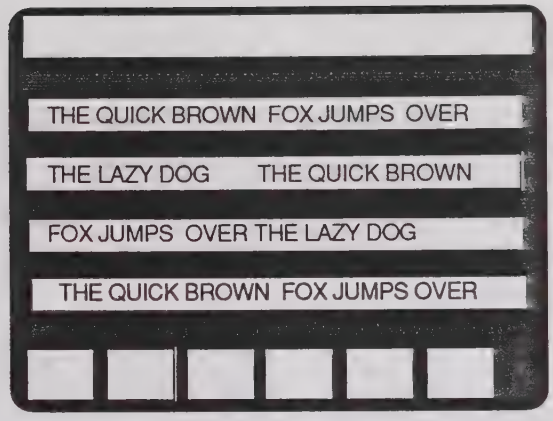
LINE MUX with PAD



DTE ONLY

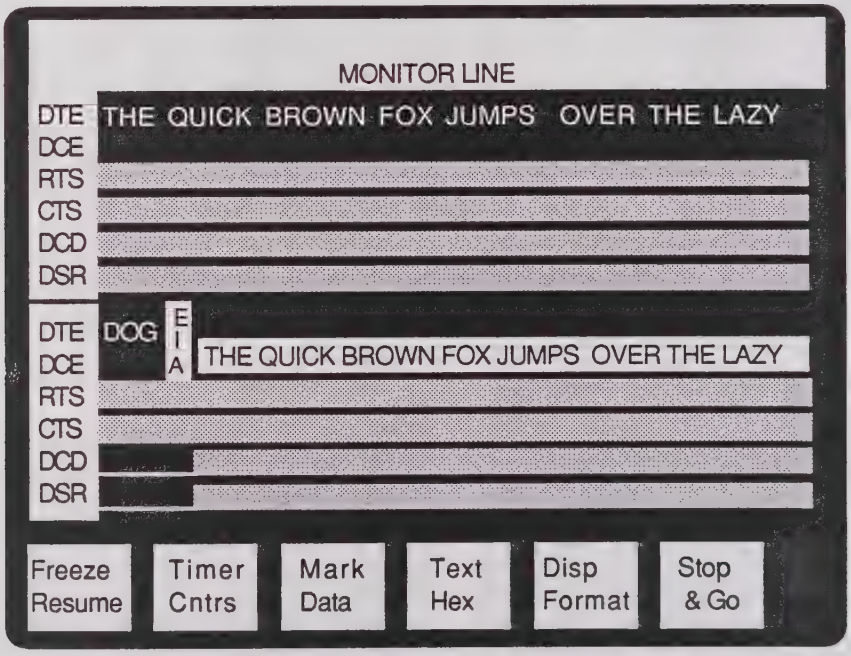


TIME MUX



DCE ONLY

The LINE MUX with EIA display format shows not only the DTE and DCE data but the handshaking lines of the RS-232C interface. Changes in the EIA lines are marked with a symbol called "EIA" and the actual lines that changed are displayed as a thin line for OFF and a shaded line area for ON. Observe the figure below (LINE MUX with EIA), and you can see that DCD & DSR changed to ON (true) when the DCE started transmitting the FOX message.



LINE MUX with EIA

6.14 STOP AND GO

This function is different from the FREEZE/RESUME in that it stops the 841A from capturing data. The STOP - GO [SK-6] softkey is for turning on and off the capturing process. In the available memory buffer, you may want to capture some small chunks of data at different times in the same buffer. Stop and Go gives you this option, but remember that you can't control the wrap around of the main buffer, so this operation is hard to control manually at baud rates up to 64K bps full duplex. Normally, this feature is only useful for slow speeds.

Note: Due to processing time, it may take a few seconds to finish updating the screen.

Examine Capture Buffer

7.0 GENERAL

More information about the data you have captured can be seen through the Examine Buffer process. Once you have the data in memory, the 841A will display special screen headers to help you identify data problems. You can use the trigger set up that was set for capturing data to also search the buffer. It is now possible to print out multiple pages starting at a frame number in the buffer. Using the GOTO function you can randomly jump to any frame or block page within the buffer. You can also switch between TEXT and HEX to see any bit pattern problems.

7.1 TOP HEADER LINES

Each of the protocols has a unique header, or headers, to you help decode the communication data. The 841A has eight different headers, COP =1, X.25 =1, SDLC/SNA =4, SS#7 =2. Some of the display headers are dynamic, and change as the cursor moves from frame to frame. To best use the Examine Buffer mode, become familiar with the headers associated with the protocol in use.

7.1.1 ASYNC, BISYNC, SYNC HEADER

The COP examine header appears as the following:

```
Current Blk = 1          Last Blk = 883          Shift = 0
Hex = 54    Dec = 84     Oct = 124     Bin = 01010100
```

CURRENT BLK — Indicates the capture buffer block reference number of the current cursor position. Block number one is the beginning of the buffer.

LAST BLK — Indicates how many blocks of data were saved in the buffer. (One block is equal to two to three screen pages.)

SHIFT — Indicates the bit "shift" position within a byte that you are using as a reference to display all the data on the screen. This is very useful if the system is dropping (or adding) a bit to the data stream once in a while. You can shift the whole screen display in bit positions until the correct data is shown. This does not modify the data in the capture buffer.

HEX — Displays the hex value of the character that the cursor is positioned on.

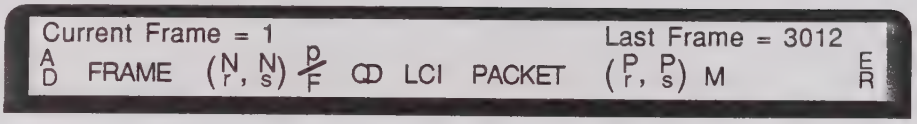
DEC — Displays the decimal value of the character that the cursor is positioned on.

OCT — Displays the octal value of the character that the cursor is positioned on.

BIN — Displays the binary value of the character that the cursor is positioned on. The least significant bit is to the right, and the most significant bit is to the left.

7.1.2 X.25 HEADER

This BOP examine header appears as the following:

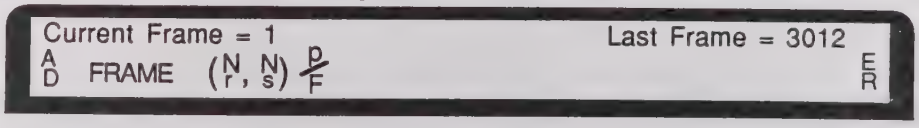


CURRENT FRAME	Indicates the capture buffer frame reference number of the current cursor position.
LAST FRAME	Indicates how many frames of data were saved in the buffer.
A_D	Address field. 8 bits.
NOTE:	*The address field defaults to displaying as "A" or "B", but can be viewed as 01(hex) or 03(hex) by pressing the softkey TEXT/HEX.*
FRAME	Frame type. Decoded into an English mnemonic.
N_r	Receive sequence number.
N_S	Send sequence number.
P/f	Poll / Final bit.
Q	Data Qualifier bit.
D	Delivery confirmation bit.
LCI	Logical Channel Indicator field.
PACKET	Packet type. Decoded into an English mnemonic.
P_r	Packet Receive Sequence number.
P_S	Packet Send Sequence number.
M	More data bit.
E_R	Frame error condition. If nothing is shown in this column, then NO error was detected.

C = Bad CRC code	S = Short frame
L = Long frame	I = Invalid frame
A = Aborted frame	O = Overrun
U = Undefined error	

7.1.3 SDLC HEADER

This BOP examine header appears as the following:

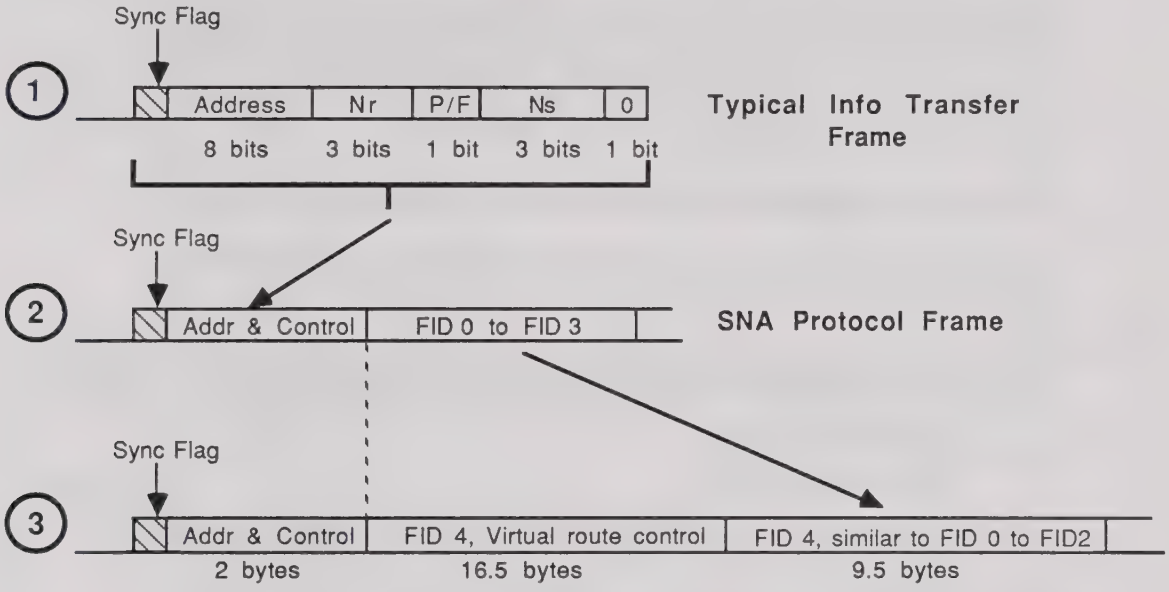


CURRENT FRAME	Indicates the capture buffer frame reference number of the current cursor position. .
LAST FRAME	Indicates how many frames of data were saved in the buffer.
A_D	Address field. 8 bits.
FRAME	Frame type. Decoded into an English mnemonic.
N_r	Receive sequence number.
N_S	Send sequence number.
P/f	Poll / Final bit.
E_R	Frame error condition. If nothing is shown in this column, then NO error was detected.

C = Bad CRC code	S = Short frame
L = Long frame	I = Invalid frame
A = Aborted frame	O = Overrun
U = Undefined error	

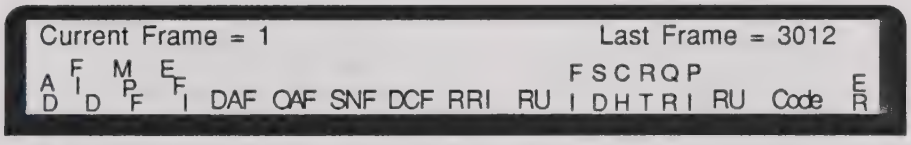
7.1.4 SNA HEADER

The SNA Examine header is dynamic and will change in layout from SNA frame to SNA frame on the FID type. In the following figure, the SNA protocol layout varies from FID type to FID type. First is the SDLC/SNA control header of the frame. FID 0 to FID 3 have similar fields shown in item 2 after the address field. When we get to a FID 4 frame, more bytes of virtual route control are added between the common FID 0 area and the address field. To better help you decode SNA, different headers will be displayed at the top of the screen.



SNA FID 4 Protocol Frame has additional control information

Frames of FID 0 to FID 3 will use a common header, except that FID 3 will display English decoding in the DAF & OAF fields:



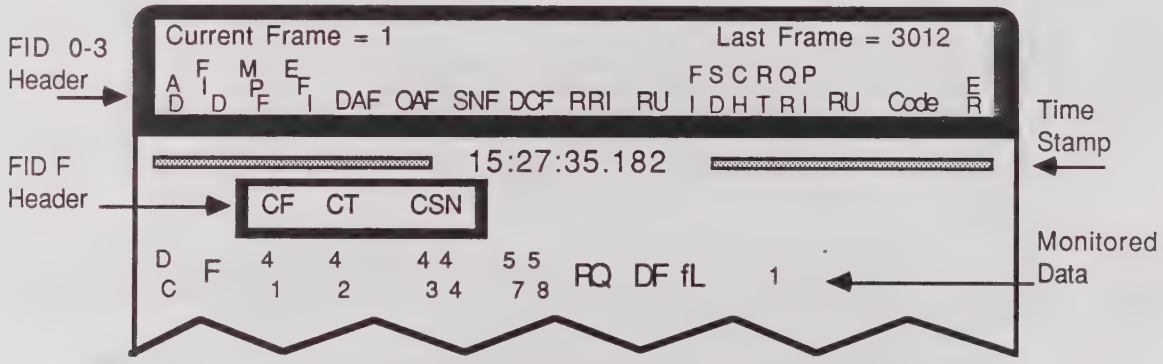
CURRENT FRAME	Indicates the capture buffer frame reference number of the current cursor position.
LAST FRAME	Indicates how many frames of data were saved in the buffer.
A_D	Address field. 8 bits.
FID	Field Identifier
MPF	Mapping Field.
EFI	Expedited Flow Indicator.
DAF	Destination Address Field. (English decode for FID 3)
OAF	Origination Address Field. (English decode for FID 3)
SNF	Sequence Number Field.
DCF	Data Count Field.
RRI	Request-Response Indicator.
RU	Request-Response Unit.
F_I	Format Indicator.

(Contd)

SD	Sense Data Included Indicator.
CH	Chaining Indicator.
RT	Response Type Indicator.
QR	Queued Response Indicator.
PI	Pacing Indicator.
RU Code	Request-Response Unit Code.
ER	Frame error condition. If nothing is shown in this column, then NO error was detected.

C = Bad CRC code S = Short frame
L = Long frame I = Invalid frame
A = Aborted frame O = Overrun
U = Undefined error

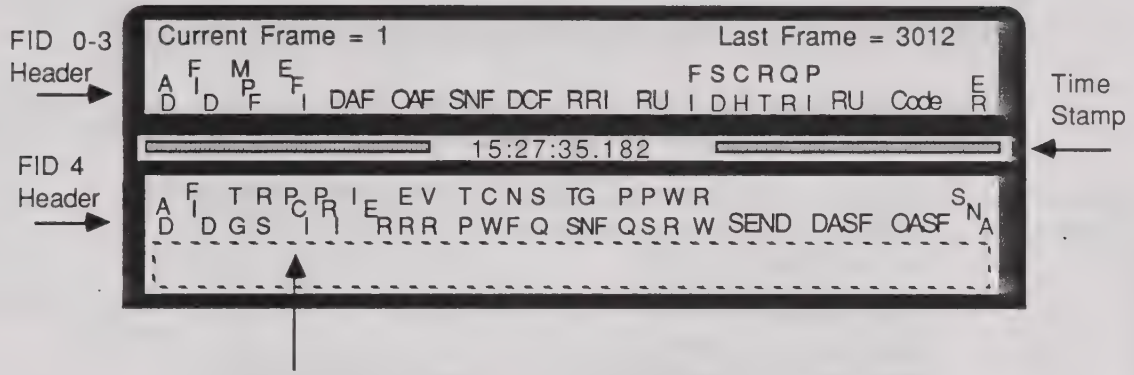
The Frame for FID F has the following header:


FID 0-3 Header
Current Frame = 1
Last Frame = 3012
AD FID MPF EFI DAF OAF SNF DCF RRI RU FSCHRTI QPRI RU Code ER
Time Stamp
FID F Header
15:27:35.182
CF CT CSN
DC F 41 42 44 34 55 78 RQ DF fL 1
Monitored Data

CURRENT FRAME	Indicates the capture buffer frame reference number of the current cursor position.
LAST FRAME	Indicates how many frames of data were saved in the buffer.
AD	Address field. 8 bits.
FID	Field Identifier.
CF	Command Format.
CT	Command Type.
CSN	Command Sequence Number.
DCF	Data Count Field.
RRI	Request-Response Indicator.
RU	Request-Response Unit.
FI	Format Indicator.
SD	Sense Data Included Indicator.
CH	Chaining Indicator.
RT	Response Type Indicator.
QR	Queued Response Indicator.
PI	Pacing Indicator.
RU Code	Request-Response Unit Code.
ER	Frame error condition. If nothing is shown in this column, then NO error was detected.

C = Bad CRC code S = Short frame
L = Long frame I = Invalid frame
A = Aborted frame O = Overrun
U = Undefined error

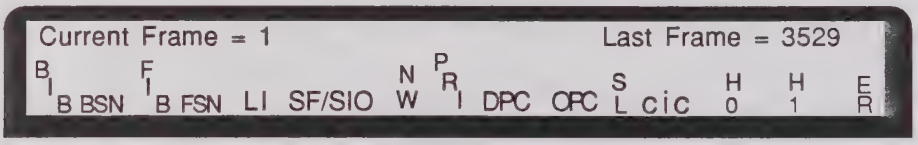
FID 4 has a special virtual routing control header on the 841A. The virtual routing control codes are displayed in the two lines of the status header, at the top of the screen, so you can observe the common fields below and the virtual fields above.


FID 0-3 Header
Current Frame = 1
Last Frame = 3012
AD FID MPF EFI DAF OAF SNF DCF RRI RU FSCRQP IDHTRI RU Code ER
Time Stamp
15:27:35.182
FID 4 Header
AD FID TG RS PCI PRI IER EV TCNS TG PPWR SNA DGS I I RRR PWFQ SNF QSR W SEND DASF OASF
Virtual routing information ends up in this dotted area of the header

CURRENT FRAME	Indicates the capture buffer frame reference number of the current cursor position.
LAST FRAME	Indicates how many frames of data were saved in the buffer.
AD	Address field. 8 bits.
FID	Field Identifier
TG	TG Sweep
RS	Explicit Route - Virtual Route Support Indicator
PCI	Virtual Route Pacing Indicator
PRI	Network Priority
IER	Initial Explicit Route Number
ER	Explicit Route Number
VR	Virtual Route Number
TP	Transmission Priority Field
CW	Virtual Route Change Window Indicator
NF	TG Non-Fifo Indicator
SQ	Virtual Route Sequence and Type Indicator
TG SNF	TG Sequence Number Field
PQ	Virtual Route Pacing Request
PS	Virtual Route Pacing Response
WR	Virtual Route Change Window Reply Indicator
RW	Virtual Route Reset Window Indicator
SEND	Virtual Route Send Sequence Number
DASF	Destination Subarea Address Field
OASF	Origin Subarea Address Field
SNA	SNA Indicator

7.1.5 SS#7 HEADER

The SS#7 Examine header has two layouts. One header is for full screen data presentation and one header is for split screen data presentation. This is the full screen header:



CURRENT FRAME Indicates the capture buffer frame reference number of the current cursor position.
LAST FRAME Indicates how many frames of data were saved in the buffer.
BIB Backward Indicator Bit. 1 bit.
BSN Backward Sequence Number.
FIB Forward Indicator Bit. 1 bit.
FSN Forward Sequence Number.
LI Length Indicator. 2 hex digits.
SF/SIO Status Field / Service Information Octet.

LSSU's

O = Out of Alignment
N = Normal Alignment
E = Emergency Alignment
OS = Out of Service
P = Processor Outage
B = Busy

MSU's

Tup = Telephone User Part
Spar = Spare
Mgmt = Management Message
Test = Testing & Maintenance
Dup1 = Data User Part Call
Dup2 = Data User Part Facility
ISDN = ISDN User Part
SCCP = Signalling Connection Control Part
u0 to u15 = Undefined 0 to 15

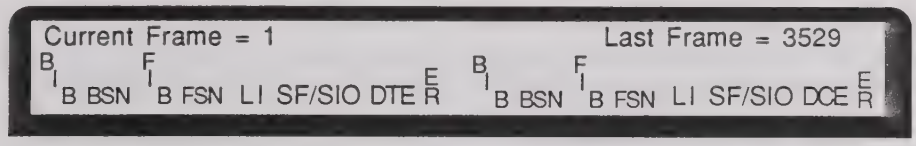
NW Network

N = National
I = International
n = Reserved for National
i = Reserved for International

PRI Priority. Value can be 0 to 3.
DPC Destination Point Code. 2 to 3 hex digits. Also displayed in decimal (Detailed Display Format)
OPC Originating Point Code. 2 to 3 hex digits. Also displayed in decimal (Detailed Display Format)
SL Signalling Link Code. 1 hex digit. Also displayed in decimal (Detailed Display Format)
CIC Circuit Identificaton Code. 2 hex digits. Also displayed in decimal (Detailed Display Format).
H0 Heading 0; 4 bits. See Appendix B for a table of HO & H1 labels.
H1 Heading 1; 4 bits.
ER Frame error condition. If nothing is shown in this column, then NO error was detected.

C = Bad CRC code
S = Short frame
L = Long frame
I = Invalid frame
A = Aborted frame
O = Overrun
U = Undefined error

For the Split Screen header, the DTE MSUs are shown on the left, while the DCE MSUs are in the right column.



CURRENT FRAME Indicates the capture buffer frame reference number of the current cursor position.
LAST FRAME Indicates how many frames of data were saved in the buffer.
BIB Backward Indicator Bit.
BSN Backward Sequence Number.
FIB Forward Indicator Bit.
FSN Forward Sequence Number.
LI Length Indicator.
SF/SFO Status Field / Service Information Octet.

LSSU's

O = Out of Alignment
E = Emergency Alignment
P = Processor Outage
N = Normal Alignment
OS = Out of Service
B = Busy

MSU's

Tup = Telephone User Part
Mgmt = Management Message
Dup1 = Data User Part Call
ISDN = ISDN User Part
u0 to u15 = Undefined 0 to 15
Spar = Spare
Test = Testing & Maintenance
Dup2 = Data User Part Facility
SCCP = Signalling Connection Control Part

ER Frame error condition. If nothing is shown in this column, then NO error was detected.

C = Bad CRC code
L = Long frame
A = Aborted frame
U = Undefined error
S = Short frame
I = Invalid frame
O = Overrun

7.2 SCROLLING UP & DOWN

You can move the cursor from character to character or frame to frame in the examine mode by pressing the UP or DOWN arrow keys. In all protocols, you will move one line at a time with the UP/DOWN arrow keys.

7.3 PREVIOUS & NEXT PAGE

There are two softkeys labeled PREV PAGE [SK-1] and NEXT PAGE [SK-2]. This allows you to move one full screen page at a time.

7.4 HEX/TEXT DISPLAYS

For all protocols, the data can be presented in its text code (ASCII, EBCDIC, EBCD, IPARS or Decoded ENGLISH) fields by the CONFIG SETUP selections. At times it is desirable to see the information in HEX format to see each of the associated bits within the byte captured. The TEXT - HEX [SK-3] softkey is for switching the display over to hex format.

7.5 GOTO FUNCTION

To randomly jump from one block or frame to another within the buffer, select [GOTO] softkey [SK-3]. Look at the top two lines of the screen and you will see the current and last block numbers displayed.

7.6 SEARCH EVENT

The TRIGGER page can be used to quickly search through the buffer for a specific pattern or event. In the EXAMINE BUFFER screen you can select one of your previously defined triggers [a through f] and the 841A will use this trigger to scan the buffer until the condition is met. This key is named SEARCH EVENT [SK-5].

7.7 BIT SHIFT FUNCTION

The bit shift function can only be used for COP operations. It allows you to "shift" the data bits one position to the left. Therefore, if a bit was lost or gained in the monitoring session, a bit shift would re-establish the correct bit order after the point of the error. The capture buffer data is not altered.

7.8 PRINT BUFFER

See section 13.0 on printing.

7.9 STATISTICS COUNTERS (X.25, SDLC and SS#7 ONLY)

The Statistics displays are sets of protocol-specific level 2 and level 3 counters. Included are ERROR activities such as Errored Frames, Short Frames and CRC Errors, as well as Total Frames. All counters are separated for DTE and DCE sides of the line.

In X.25, Statistical counts can be made on a specific Logical Channel Indicator; see section 5.3.

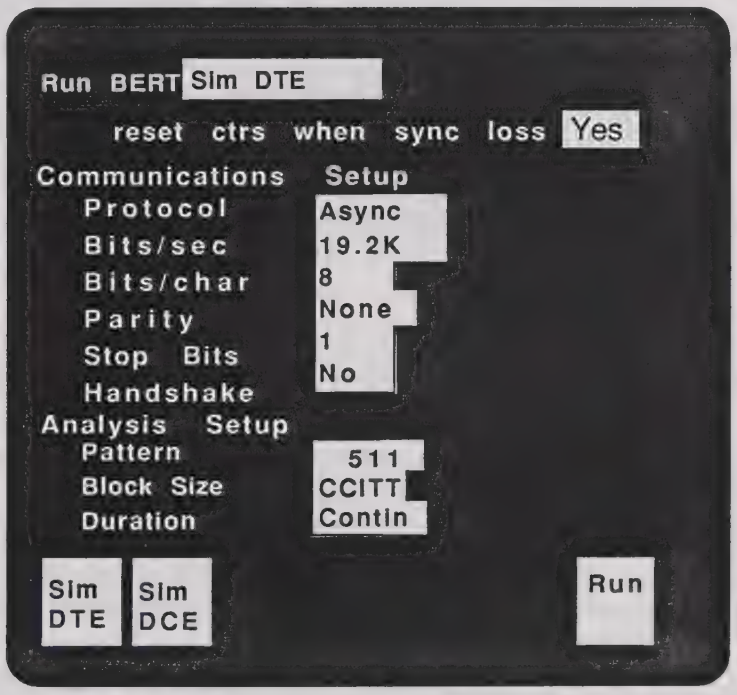
BERT

8.0 BERT

BERT, or Bit Error Rate Test, is a method of testing the performance of the transmission line. This is accomplished by sending and/or receiving a known psuedo-random data stream and checking it for errors. Single bit errors or multiple bit errors (bursts) can be caused by line noise or an equipment malfunction. For leased-line applications an acceptable error rate is one bit error per million, or better. The 841A will measure one bit in error out of 1000 million (10^{-9}). The 841A can generate pseudo-random block patterns of 63, 511, 1023 and 2047 bits, alternate 1's and 0's, the FOX message, and a user-defined pattern up to 48 bits.

8.1 COMMUNICATION SETUP

The BERT SETUP page allows you to select either ASYNC or SYNC operation. In ASYNC mode, the interface is limited to 19.2K bps maximum, and only the RS-232 interface is available for transmission. In SYNC mode, the rate is up to 64K bps and all four hardware interfaces are available.



Communications Setup Parameters

Parameter	Default	Range
BERT Run	SIM DTE	SIM DTE, SIM DCE, Run
Reset Cntrs on SYNC Loss	No	No, Yes
Protocol	Async	Async, Sync
Bits/Sec	19.2 K(Async) FROM DCE (Sync)	50, 75, 110, 134.5, 300, 600, 1200, 2400, 4800, 9600, 19.2K, 48K, 56K, 64K, FROM DCE, FROM DTE.

NOTE: For SYNC protocol, set the BITS/SEC field to FROM DCE, which will instruct the 841 to use the clocks from the modem device.

Communications Setup Parameters (cont)

Parameter	Default	Range
Parity	None	Odd, even, none.
Stop Bits	1	1, 1.5, 2.
Handshake	No	Yes, No. (This field provides the choice to the 841 to observe the logic states of the EIA handshaking signals such as CTS, DCD, DSR, and so on.)
Interface	RS-232	RS-232, V.35, RS-449 and X.21.
	Analysis Setup	
Pattern	511	63, 511, 1023, 2047, Alternate 1's and 0's, the FOX message and User-Defined.
Block Size	CCITT	CCITT only.
Duration	10^4	10^4, 10^5, 10^6, 10^7, 10^8, 10^9 bits, 5, 10, or 15 min, or Continuous.

8.2 TEST PATTERNS

In the ANALYSIS SETUP , there are three option fields. The PATTERN field allows you to select the psuedo-random bit patterns of 63, 511, 1023, 2047, Alternating 1 or 0's, FOX message, or User-defined pattern up to 6 bytes long.
Next, is the BLOCK SIZE definition. This is not selectable.
The next selection is DURATION. The duration can be set to send enough bits to satisfy a bit count (10^4, 10^5, 10^6, 10^7, 10^8, 10^9 bits) or set to run for so many minutes (5, 10, 15 minutes or continuous).

8.3 TEST SESSION

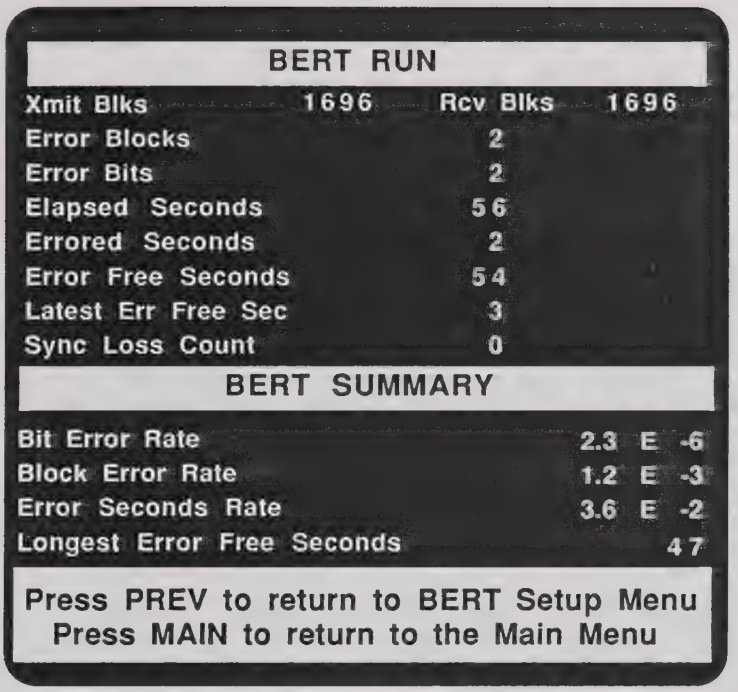
To start a test, position the cursor in the BERT RUN field and press softkey [SK-1] to select RUN.

NOTE: *When using the RS-232C interface, and the EIA HANDSHAKING field is set to YES, if one or more of the EIA signals (RTS, CTS, DTR, DSR, or DCD) are not satisfied, a warning message will flash on the screen. The message will indicate which signal is not in the correct logic state.*

Once the test has begun, a warning message: WAIT FOR DATA or GENERATING PATTERN will appear on the screen. As incoming data is detected the screen counters will automatically begin updating. You may see the message OUT OF SYNC if the received bit pattern has too many errors and re-synchronization attempts to take place.

NOTE: The BERT Setup page contains a field named "Reset Counters When Sync Loss". This selection allows the user to decide whether the counters should or should not reset upon the detection of a Sync Loss.

There are two methods for stopping a test in progress. The first is to satisfy the duration value. The second method is to press softkey [SK-6] for STOP, or the PREV or MAIN keys while the test is still in progress. In either case, at the time the test is halted, the BERT SUMMARY counters will appear across the lower portion of the screen.


BERT RUN
Xmit Blks 1696 Rcv Blks 1696
Error Blocks 2
Error Bits 2
Elapsed Seconds 56
Errored Seconds 2
Error Free Seconds 54
Latest Err Free Sec 3
Sync Loss Count 0
BERT SUMMARY
Bit Error Rate 2.3 E -6
Block Error Rate 1.2 E -3
Error Seconds Rate 3.6 E -2
Longest Error Free Seconds 47
Press PREV to return to BERT Setup Menu
Press MAIN to return to the Main Menu

8.4 RUN TIME INFORMATION

The BERT RUN page has eight rows of counters that are being updated as the test progresses. Not only can you see the number of blocks being transmitted or received on the BERT run page, but also sync loss, error counts, and error free second totals.

XMIT BLKS	Number of blocks transmitted using the pattern selection.
RCV BLKS	Number of blocks returned to the 841A that are correct.
ERROR BLOCKS	Number of received blocks that have errors in them.
ERROR BITS	Number of bits received in error.
ELAPSED SECONDS	Total run time.
ERRORED SECONDS	Number of seconds that had errors.
ERROR FREE SECONDS	Number of seconds that did not have errors.
LATEST ERR FREE SECONDS	Number of seconds since the last error.
SYNC LOSS COUNT	How many times SYNC was lost.

8.5 NOISE INJECTION OPTIONS

To check the link for ensuring that errors will be detected, and bit or burst ("noise") errors are mixed into the bit stream, the 841A is equipped with a BIT [SK1] and BURST [SK2] error generator. This noise source can effect any bit within a stream. If you are running ASYNC, the noise generator can affect the start bit, data bits or stop bit just like real noise. The BIT error injection changes one bit in the stream.

The BURST error injection is controlled by duration. You can increase or decrease the duration time the burst errors will last by using softkeys SK3 or SK4. For low baud rates (300 bps), you will want to use the maximum burst number. For higher baud rates, burst numbers much beyond 1 may be too much for the link.

8.6 STATISTICAL SUMMARY

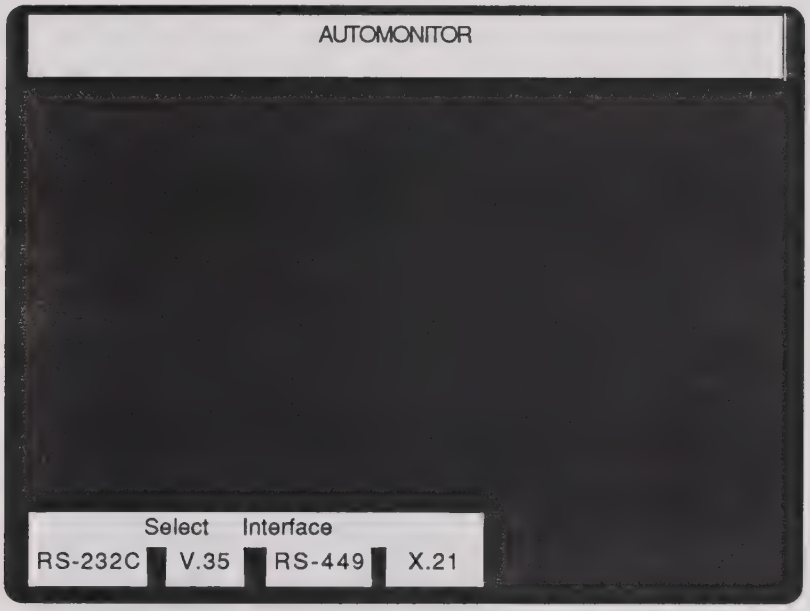
At the end of each BERT test, the lower four lines above the softkeys give the results:

Field	Equation
BIT ERROR RATE	Error bits (Receive blocks * Block size)
BLOCK ERROR RATE	Error blocks/Receive blocks
ERROR SECONDS RATE	Error Seconds/Elapsed seconds
LONGEST ERROR FREE SEC	Longest interval during the test in which an error did not occur.

AUTOMONITOR

9.0 AUTOMONITOR

The AUTOMONITOR feature of the 841A makes it quick and easy to configure the 841 without knowing the baud rate or protocol connected to it. You will, however, have to select which interface is to be used.



AUTOMONITOR samples the interface clock leads to determine the bit rate. The data leads are checked to determine the protocol, sync characters, code, and other line parameters.

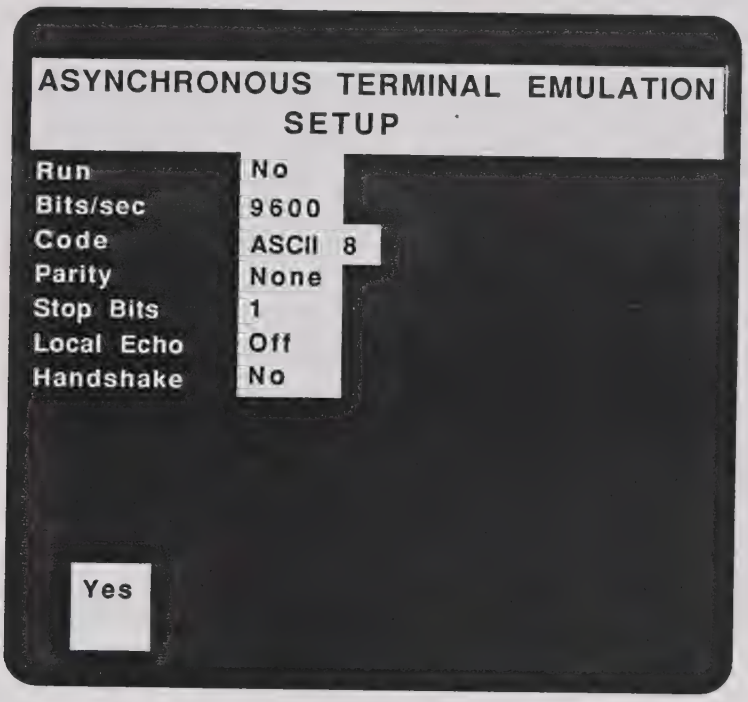
The time it takes to perform AUTOMONITOR directly corresponds to the speed of the data. Therefore, the slower the data, the more time it takes to decipher the line.

After the process takes place, the 841A enters the RUN mode with no trigger enabled.

ASYNC TERMINAL

10.0 ASYNC TERMINAL

The 841A emulates a simple ASCII terminal (DTE) through the RS-232C OUT connector on the rear panel. If the system you are connected to is half duplex, and therefore doesn't echo back the characters you type, select LOCAL ECHO to ON.



Select the parameters to match the 841 to the data line.

Move the cursor to the RUN field and press [SK-1] RUN.

To halt a session, press softkey [SK-1].

SELF TEST

11.0 SELF TEST

The self test has been designed to assist both you, as the operator, and the customer support technicians in performing tests on the video, keyboard, and memory of the 841A. The first screen of SELF TEST will also show you the Software Revision Level and date of the software running on your unit.

11.1 VIDEO TEST

To check the video circuitry and the 5-inch CRT built into the 841A, the VIDEO TEST softkey provides three tests (Character sets, Video Attributes and Grid Alignment). The first test, called CHAR SETS, is for checking the EPROM within the unit that defines the ASCII, HEX, EBCDIC, EBCD, IPARS and GRAPHIC characters which are displayed on the screen. The second test checks the high and low intensity levels of the display, and all the special flashing, inverted display modes of the video IC's. The third test is for adjusting the yoke, magnets, and beam linearity on the CRT face.

11.1.1 CHARACTER SETS

There are six character sets stored in a EPROM within the 841A. Every 4096 bytes defines 256 character symbols on the screen. The CHAR SETS [SK1] test allows you to view each character set in both text and Hex form.

11.1.2 ATTRIBUTE TEST

This test will display a different video attribute such as flashing, low intensity , high intensity and so on. If you have the external RGB color monitor attached, then you will see the four main colors produced by the 841A. See section 2.3 for more information.

11.1.3 ALIGNMENT GRID

As this test implies, a rectangular grid pattern is displayed on the screen so that linearity, height, width, and focus can be adjusted on the CRT board. These adjustments are NOT for the user in the field; they are ONLY done in the factory. Press [PREV] or [MAIN] to get out of this mode since none of the softkeys are used in this display. The GRID display is useful in adjusting an external display monitor that might need convergence or focus before a data session is run.

11.2 KEYBOARD TEST

The keyboard test displays a graphic layout of the keyboard on the screen. When each key is pressed it is illuminated on the screen within the pad drawin. Also, the character type is displayed at the top of the screen in a horizontal scrolling line.

There are two softkeys selections. The "remember" key option shows the keys continuously illuminated after they have been pressed, so you can see how many keys have been tested. The [PREV] and [MAIN] keys can't be indicated since they will return operation to the MAIN menu.

11.3 EIA TEST

This softkey selection can be used for any of the interfaces to observe the data interface as being ALIVE or INACTIVE. The display indicates:

1. Both DATA lines are checked to see if they are changing in level.
2. The three possible clock lines are measured for their frequency to the nearest 10 hertz. The frequency will be accurate to 0.02% ± 10 hertz.
3. Five of the handshaking lines are checked for a High or Low logic state.

Four softkeys across the bottom of the screen allow you to select RS-232C, V.35, RS-449 or X.21 interfaces for the test.

To exit this mode, press [PREV] or [MAIN] a couple of times. Allow the unit several seconds to exit this mode, continuing to press the MAIN key.

11.4 RAM TEST

This function will check the size and integrity of the memory. The memory test is in depth, so it will over-write menu setups. Be sure to print-out any important setups before running the memory test.

The basic test checks every bit within a word (16 bits) for a one or zero. It also tests the fact that writing to any one word in memory doesn't write into another by error. 34 tests are performed on each word in memory. Test time is approximtely 1.5 minutes to check out 512K bytes of memory.

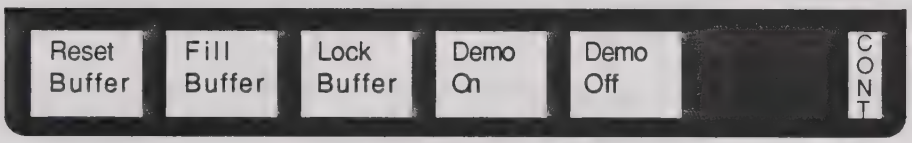
RESET OPTIONS

12.0 RESET OPTIONS

The 841A will not need to be reset unless the battery fails, or you want to totally clear a menu page within the unit. If something goes wrong with the unit operation, the master reset is SYSTEM [SK-1] under the Reset Menu. The Time and Date reset is for setting the real-time (battery powered) clock to your time zone. The FILL BUFFER function is useful in learning how to use the 841A with inputting online data for each protocol.

Pressing the [CONT] key in the RESET MENU will give you two sets of selections.

First set of reset options



Second set of reset options

12.1 SYSTEM

The 841A holds all of the settings for the Configuration, Trigger, and other menu pages in battery-backed-up memory. If the battery is changed, or the battery fails, or some type of power failure should corrupt the memory data, then the 841A unit will not display the menus correctly, or even run. The SYSTEM reset is a master software reset to the unit and is NOT the same as a hardware reset from the keyboard or turning the power off and on.

If you suspect that something has gone wrong with the operation of the 841A, first perform a hardware reset by powering off then on, or by disconnecting and re-connecting the keyboard. Next, at the main menu press [CONT] and then RESET [SK-3] to get to the RESET MENU. Now press the SYSTEM [SK-1] softkey.

12.2 DATE & TIME

The 841 has a real-time clock which keeps track of the date and time. To change the data and/or the time, press the [DATE] & [TIME] key of the RESET menu. This gives you the RESET TIME OF DAY menu. Change the current date by entering the appropriate month, day, in the "CHANGE TO" field and then press [SK-1] to set the new date. Change the current time by entering the appropriate hour, minute, and second in the "change to" field and then press [SK-1]. The time is kept as a 24-hour clock, therefore 1:00 pm should be entered as 13:00.

12.3 CAPTURE BUFFER

The main capture buffer memory not only holds the data monitored, but also what CONFIG SETUP was used. This reset will set the buffer memory back to a state of EMPTY with no configuration setting at all. The softkey is called RESET BUFFER [SK-1] on the second set of reset keys.

12.4 OTHER RESETS

These other resets are ALL found in the RESET MENU page.

CONFIG SETUP RESET	Will reset the configuration page back to ASYNC with preset defaults.
TRIG SETUP RESET	Will clear the trigger pages for each protocol.
BERT SETUP RESET	Will set the BERT page to ASYNC and 19.2K bps.
ASYNC SETUP RESET	Will set the terminal emulation page to 9600 baud.
RESET BUFFER	Will empty the buffer of any data.

Special presets:

FILL BUFFER	This is not a reset. It is more like a "preset". Depending upon the protocol selected in the configuration page, the 841A will create a pattern of that protocol in the capture buffer memory. This data pattern can be used for training on how to trigger, examine, or use the re-monitor capabilities of the 841A unit.
LOCK BUFFER	This feature is to prevent you from overwriting valuable communication data that was stored into the buffer.
DEMO ON & OFF	Allows continuous re-monitor of the capture buffer. Normally the re-monitor function will stop at the end of the capture buffer rather than looping back to the beginning to start all over again.

Printing

13.1 ANY SCREEN PAGE

The 841A allows you to print any screen displayed at any time. This feature is very useful if you would like hard copies of your setup, such as CONFIG and TRIGGER menus. Each screen printed is dated and time-stamped. If you are keeping a log of communciation problems, this time-stamping can be useful.

The inverted video areas (white with black letters) on the screen are shown in black, while the normal video areas are printed out with black letters. The inverted normal and inverted half-intensity areas are displayed the same way on the print-out.

The 841A can print data from the screen while it is actively capturing data. The unit will take a "snap shot" of the screen when the [PRINT] key is pressed.

13.2 MULTIPLE BLOCKS FROM BUFFER

The 841A can print out multiple blocks of communication data from the capture buffer. You are NOT limited to individual screen dumps. The selection for multiple-block printing is in the EXAMINE BUFFER page, under the second set of softkey selections. The softkey is named [PRINT BUFFER].

Async, Bisync, Sync, IPARS and DDCMP captured data are printed based upon the block numbers, while the BOP protocols (X.25, SDLC, SS#7) are printed based upon the frame number. In the Exam Buffer page, the block or frame number is displayed in the top menu header line as you scroll through the communication data.

13.3 COMPATIBLE PRINTERS

The 841A has a parallel printer interface on the back panel that is compatible with dot-matrix printers such as the EPSON FX-86E. The connector is compatible with the IBM PC printer connector. Software commands are sent out during printing to override the switch settings within the printer and to set the graphics mode.

841A compatible printers
EPSON FX-86E
EPSON LX-86
EPSON MX-80
NEC P6

Incompatible printers
IBM Prowriter - no graphics
Daisy Wheel printers
Teletypes

Disk Utility

14.0 DISK UTILITY

The 841A disk operation provides for two types of storage: real-time data recording and file system storage. Real-time recording provides the ability to save a monitoring session to disk for later review or analysis. File System storage is useful for saving Configuration, Trigger, BERT and Async Terminal Emulation set ups.

While performing certain functions the 841A may display a Warning or Caution message. These messages are provided to keep you informed of the task being performed by the 841A, or of potential negative results from performing a specific task.

Before beginning any disk utility operation, make sure to use a 3 1/2 inch Double Sided HIGH DENSITY disk.

14.1 FORMATTING THE DISK

When starting with a blank disk, the first operation to perform is a FORMAT. As previously stated, there are two types of formatting, one for real-time recording and one for file system storage.

14.1.1 REAL-TIME RECORDING FORMAT

1. To format a disk in preparation for a real-time recording session, press the softkeys in the following sequence (starting at the MAIN menu):

   [CONT], then [DISK UTILITY], then [Disk Record], then [Format Disk].

NOTE: One of the following messages will appear on the screen :

DISK NOT FORMATTED	- indicates a blank disk.
DISK IS FORMATTED FOR FILE SYSTEM	- continuing on will re-format the disk.
DISK IS EMPTY	- disk is blank, but formatted.

   If the disk has already been formatted the screen will display the file summary information.

2. Press softkey [FORMAT DISK] to proceed with formatting the disk. The 841A will then begin formatting the disk and present a counter to the screen indicating:

   FORMATTING CYLINDER 00 SIDE 0

3. When the formatting is completed the 841 will display the prompt: DISK NAME_____. Use the keyboard to enter up to 16 characters (alpha-numeric, spaces).

4. Press [SK-1] to save the name (or update).

   The 841A then responds with the message: FORMAT COMPLETED

5. To format another disk press [PREV], or to return to the MAIN menu, press the [MAIN] key.

14.1.2 FILE SYSTEM FORMAT

1. To format a disk in preparation for file system storage, press the softkeys in the following sequence (starting at the MAIN menu):

   [CONT], then [Disk Utility], then [File System], then [CONT], then [Format Disk], then [Format Disk].

NOTE: One of the following messages will appear on the screen

DISK NOT FORMATTED	- indicates a blank disk.
DISK IS FORMATTED FOR REAL TIME RECORDING	- continuing on will re-format the disk.
DISK IS EMPTY	- disk is blank, but formatted.

Again, the 841A will display: FORMATTING CYLINDER 00 SIDE 0

If the disk is bad, and cannot be formatted, the 841A will display: DRIVE NOT AVAILABLE.

2. When the formatting is completed, the 841 will display: FORMAT COMPLETED .

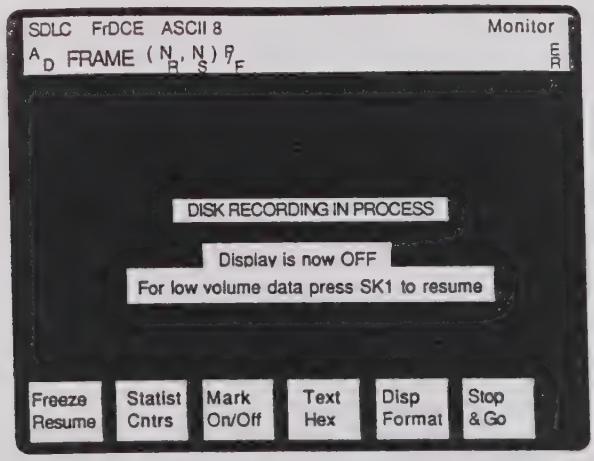
3. To format another disk press [PREV], or to return to the MAIN menu, press the [MAIN] key.

14.2 DATA RECORDING

1. At the MAIN menu, select the [CONFIG SETUP] softkey. Match the line parameters of the 841 to the line under test. Now move the cursor to the DISK RECORD field and select [ENABLE].

NOTE: The default setting is DISABLED. The disk is used as a continuous buffer of up to 1.2M Bytes of data storage. The disk can be operated as a Continuous (wrap-around) or End Of Disk recording mode and is selected on the Trigger Setup page in the "BUFFER FULL" field.

2. Return to the MAIN menu and proceed to the [RUN] mode. When the recording begins, the Configuration Setup parameters are appended to the beginning of the data file. The screen now changes to indicate that recording is taking place. A message is then displayed on the screen : "DISK RECORDING IN PROCESS - Display is now OFF, for low volume data press SK1 to resume".



NOTE: "Low volume data" typically refers to the density (or loading) of the data traffic being monitored and recorded. To view the data as it is being recorded press [SK-1]. However, high speed data recording (above 9600 bps) requires special care for maximum efficiency. The physical limitations of a floppy disk drive are stressed during high speed AND high density conditions. For extended periods of time under these conditions, the possibility of losing a frame or part of a frame may occur. It is, therefore, recommended that selective monitoring be used in the form of Filtering (see Triggers), to enhance the reliability of capturing all of the data.

When recording SDLC/SNA data, regardless of the frame size selected on the Configuration Setup page, up to 3000 frames can be stored on the disk.

14.3 SAVING A FILE SYSTEM SETUP

The file System directory can store up to 32 files. The first step to saving a File System Setup (after formatting the disk) is to define the file. Remember, a File System Setup can be either a Configuration/Trigger setup, a BERT setup, or an ASYNC Terminal configuration.

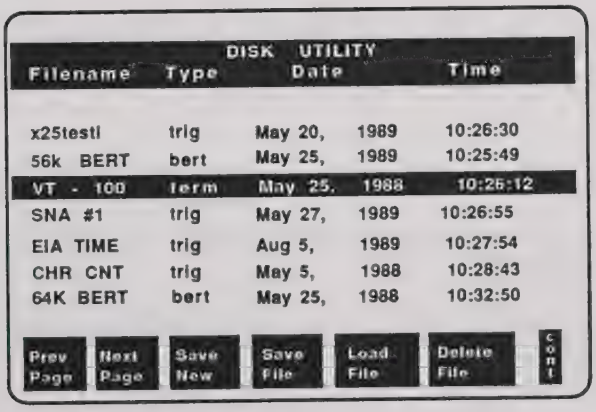
1. From the MAIN menu, make sure you have selected a SETUP (Config, Trig, etc) type. Press the [CONT] key, then [DISK UTIL], then [FILE SYSTEM], then [SAVE NEW].

2. The 841A then prompts you to enter a File Name. A File Name can consist of up to eight characters.

3. Next, select the appropriate File TYPE (Config, Trig, BERT, TERM, etc) using the softkeys.

4. Complete the file system Save by pressing the [SAVE] softkey.

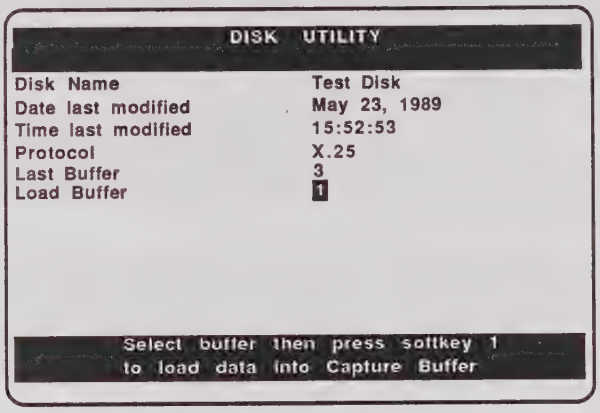
NOTE: The screen now changes to the DISK UTILITY header display. A directory appears with the individual File NAMES, TYPE of file, and the TIME and DATE when the file was last maintained.


DISK UTILITY
Filename Type Date Time
x25testl trig May 20, 1989 10:26:30
56k BERT bert May 25, 1989 10:25:49
VT - 100 term May 25, 1988 10:26:12
SNA #1 trig May 27, 1989 10:26:55
EIA TIME trig Aug 5, 1989 10:27:54
CHR CNT trig May 5, 1988 10:28:43
64K BERT bert May 25, 1988 10:32:50
Prev Page
Next Page
Save New
Save File
Load File
Delete File
cont

14.4 LOADING A DATA FILE INTO BUFFER

1. From the MAIN menu, press the following keys: [CONT], [DISK UTILITY], [DISK RECORD], then [LOAD BUFFER].

   The screen now displays the Data Summary information.



2. The 841A displays a prompt at the bottom of the screen to SELECT a BUFFER. Using the numeric keys on the keyboard, select the desired buffer. Remember that up to three full capture buffers can be recorded to disk. The 841 segments the data being recorded into 80K byte blocks, so 15 x 80K bytes (of capture buffer) = 1.2Mbytes of disk storage.

3. Press [SK-1] to execute the LOAD command.

The 841A displays the messages: LOADING CAPTURE BUFFER followed by LOAD COMPLETED.

4. Press [MAIN], then [RUN] or [EXAM BUFR] to review the data.

NOTE: At the end of the capture buffer, the next buffer on disk must be read.

14.5 RETRIEVING A FILE SYSTEM SETUP

1. From the MAIN menu, press the following keys: [CONT], [DISK UTILITY], [FILE SYSTEM], then [LOAD BUFFER].

2. Select the desired File by using the cursor UP and DOWN keys, along with [PREV PAGE] or [NEXT PAGE] softkeys. Position the cursor over the desired file and press the [LOAD FILE] softkey. When selecting a TRIGGER Setup the Configuration Setup will also be loaded.

3. Press the [MAIN] key to return to the MAIN menu.

14.6 RENAME DISK

1. From the MAIN menu, press the [DISK UTILITY] softkey, then [DISK RECORD], and finally [RENAME DISK]. The screen now changes to DISK NAME_____.

2. Type the new file name (up to 16 characters), then press [SK-1].

3. Press the [MAIN] key to return to the MAIN menu.

14.7 DISK COPY

The DISK COPY function allows for making additional copies of a "master" disk. After recording data to disk from the line under test, or to make copies of a FILE SYSTEM disk, begin at the MAIN menu. Press the [CONT] key to display the second set of MAIN menu selections. Before starting a Disk Copy session, be sure that the Destination Disk is formatted prior to beginning this sequence.

1. Press [SK-4] DISK UTILITY, followed by [SK-3] DISK COPY.

   NOTE: A message is now displayed warning you that proceeding with the Disk Copy will erase the contents of the Capture Buffer.

2. Press [SK-1] to continue.

3. Insert the "Master" disk into the drive and press [SK-1]. The message "DiskCopy In Progress - Please Wait" will appear as the disk is read into memory.

4. After a short period of time, the 841A displays the message "Insert Destination Disk into Drive".

5. Remove the Master disk and insert the Destination disk. Press [SK-1].

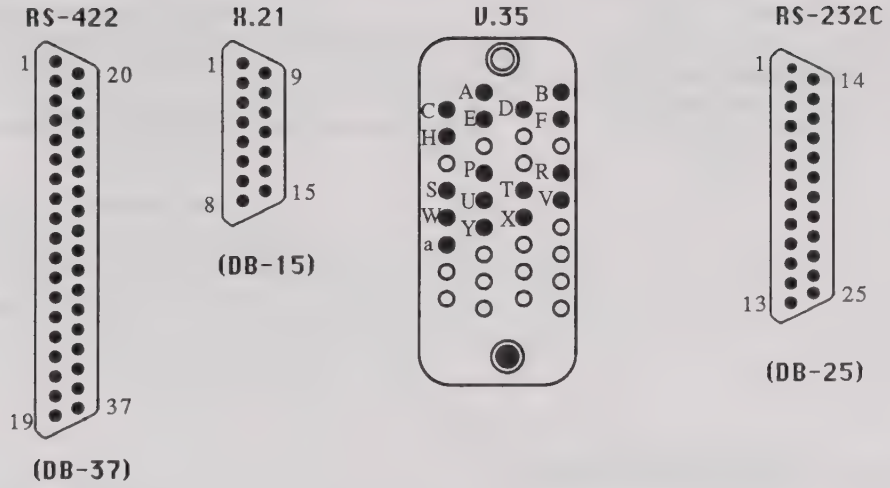
6. This process will be repeated three times, due to the disk capacity being three times larger than the capacity of the Capture Buffer.

7. Upon completion of the Disk Copy, the message "DO YOU WISH TO COPY ANOTHER DISK?" will appear. To copy another disk, press [SK-1]. If you are finished copying disks press [PREV] or [MAIN].

Appendix A

Data Interfaces

A. Connector Orientation



B. Interface Wiring/Function

FUNCTION	RS-422		H.21		V.35	RS-232C	
Shield (ground)	1		1		A	1	FG
Transmit data	4/22	SD	2/9	TA/TB	P/S	2	TD
Receive data	6/24	RD	4/11	RA/RB	R/T	3	RD
Request to send	7/25	RS	3/10	CA/CB	C	4	RTS
Clear to send	9/27	CS			D	5	CTS
Data set ready	13/31	RR			E	6	DSR
Signal ground	19	SG	8		B	7	SG
Data carrier Detect	11/29	DM	5/12	IA/IB	F	8	DCD
TD clock, from DCE	5/23	ST	6/13	SA/SB	Y/a	15	TXC
RD clock, from DCE	8/26	RT			V/X	17	RXC
Data terminal ready	12/30	TR			H	20	DTR
Clock, from DTE	17/35	TT			U/W	24	ETC

NOTES:

1. Balanced connections are shown in the format (+/-).
2. Pins not listed are not wired.

External Equipment Interfaces

A. Printer (DB-25), Parallel Interface

PIN	FUNCTION
1	Data strobe (negative)
2-9	Data lines (D0-D7)
10	Data acknowledge
11	Busy (from printer)
18-25	Ground

B. Remote (DB-25), RS-232C Interfaces

PIN	DESIG	FUNCTION
2	TD	Trmt data, from 841
3	RD	Rcv data, to 841
4	RTS	Wired true (+5V)
7	SG	Signal ground
8	DCD	Carrier detect from modem
20	DTR	From 845

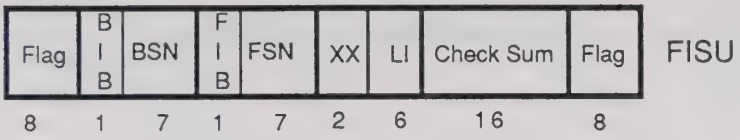
C. RGB Color Monitor (DB-9)

PIN	FUNCTION
1, 2	Ground
3	Red output
4	Green output
5	Blue output
6	Intensity (wired to ground)
7	Video output
8	Horizontal drive
9	Vertical drive

APPENDIX B - MORE SS#7 INFORMATION

There are three types of SUs sent by Signalling System #7.

Fill-In Signalling Unit (Idle frame)



FISU

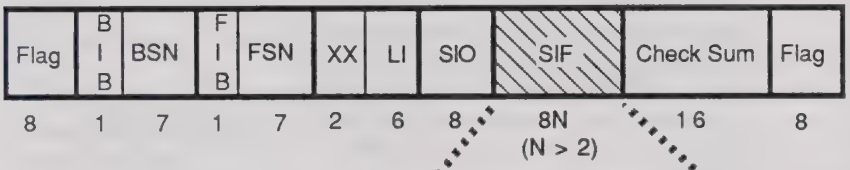
BIB= Backward Indicator bit
FIB= Forward Indicator bit
BSN= Backward Seq. number
FSN= Forward Seq. number
XX= spare bits
LI = Length Indicator

Link Status Signalling Unit (Line Status)

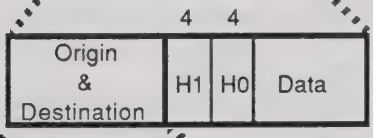
LSSU

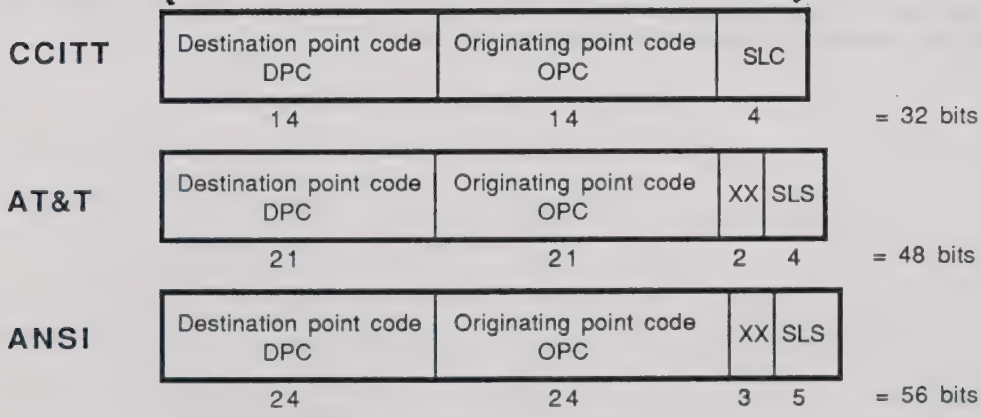
SF= Status Field
SIO= Service Information Octet
SIF= Signalling Information Field

Message Signalling Unit (Data Packet)

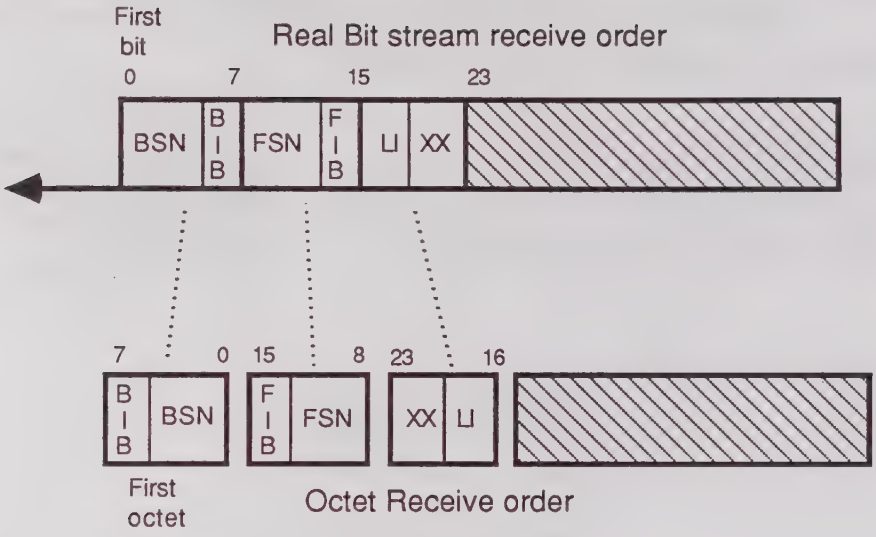


MSU





Each of the previous SU frame examples can be broken down into octets (8 bit groups).



The octet receiver order can be described as follows:

Octet 1	BIB	most significant bit of eight. First BYTE
	BSN	7 least significant bits of the same eight.
Octet 2	FIB	most significant bit of eight. Second BYTE
	FSN	7 least significant bits of the same eight.
Octet 3	XX	most significant 2 bits of eight. Spare bits
	LI	6 least significant bits of the same eight.
Octet 4	SF/SIO	eight bits.
Octet 5	SIF	Many octets as specified in the LI field. If this is an MSU, then the next 4, 6 or 7 octets will be the DPC, OPC and SL fields.
Octet 9,11,	H1-H0	Depending on whether CCITT, AT&T or ANSI routing label is used, this octet is the H1 or 12 & H0 fields contained in one octet.
Octet N		more octets.

The DTE & DCE Offset Trigger is good for matching SS#7 MSU patterns. If the MSU SIO PATTERN or SIO PAGE selections don't match your specific case. To use the Offset Trigger, be sure to remember that the first octet is at offset 0 and the offset numbers are referenced from that point. See section 5.1.7.

SF field (bottom 3 bits) - LSSU type

Type	Mnemonic	Hex	Offset
Out of alignment	O	0	3
Normal alignment	N	1	3
Emergency alignment	E	2	3
Out of service	OS	3	3
Processor outage	PO	4	3
Busy	B	5	3

SIO field (bottom 4 bits) - MSU type

Type	Mnemonic	Hex	Offset
Network management message	Mgmt	x0	3
Network testing & maintenance	Test	x1	3
Signalling Link Test Message	SLTM	x2	3
Signalling Connection Control Part	SCCP	x3	3
Telephone User Part	TUP	x4	3
ISDN User Part	ISDN	x5	3
Data User Part (call & ckt messages)	DUP1	x6	3
Data User Part (facility registration & cancellation)	DUP2	x7	3
Spare	u8 to u15	x8 thru xF	3

SIO field (top 4 bits) - MSU type

Type	Mnemonic	Hex	Offset
International Network	I	0x	3
Reserved for International	i	4x	3
National Network	N	8x	3
Reserved for National	n	Cx	3

NETWORK MANAGEMENT MSU (Mgmt)

Type	H0	H1	H1-H0 Octet	Offset
Spare	-	-	x0	*
Changeover & Changeback msg	CHM		x1	*
Changeover order signal		COO	11	*
Changeover acknowledge signal		COA	21	*
Changeback declaration signal		CBD	51	*
Changeback acknowledge signal		CBA	61	*
Emergency changeover	ECM		x2	*
Emergency changeover order signal		ECO	12	*
Emergency changeover acknowledgement signal		ECA	22	*
Transfer Ctrl & signalling route set congestion	FCM		x3	*
Signalling-route-set-congestion-test msg		RCT	13	*
Transfer control msg		TFC	23	*
Transfer-prohibit-allowed-restricted msg	TFM		x4	*
Transfer prohibited signal		TFP	14	*
Transfer restricted signal		TFR	34	*
Transfer allowed signal		TFA	54	*
Signalling-route-set-test msg	RSM		x5	*
Signalling-route-set-test signal		RST	15	*
Signalling-route-set-test signal		RST	25	*
Management inhibit msg	MIM		x6	*
Link inhibit signal		LIN	16	*
Link uninhibit signal		LUN	26	*
Link inhibit acknowledge signal		LIA	36	*
Link uninhibit acknowledgement signal		LUA	46	*
Link inhibit denied signal		LID	56	*
Link forced uninhibit signal		LFU	66	*
Spare	-	-	x7	*
Signalling-data-link-connection msg	DLM		x8	*
Signalling-data-link-connection-order signal		DLC	18	*
Connection successful signal		CSS	28	*
Connection not-successful signal		CNS	38	*
Connection not-possible signal		CNP	48	*
Spare	-	-	x9 to xF	*

* Note: For DTE & DCE Offset trigger use ANSI = 11, AT&T= 10, CCITT= 8

TELEPHONE USER PART (TUP)

Type	H0	H1	H1-H0 Octet	Offset
Spare	-	-	x0	*
Forward Address Message	FAM		x1	*
Initial Address Message		IAM	11	*
Initial Address message with additional information		IAI	21	*
Subsequent Address message		SAM	31	*
Subsequent Address message with one signal		SAO	41	*
Forward Set-up Message	FSM		x2	*
General forward Set-up information Msg		GSM	12	*
Continuity signal		COT	32	*
Continuity Failure signal		CCF	42	*
Backward Set-up Message	BSM		x3	*
General Request Message		GRQ	13	*
Successful Backward set-up information msg	SBM		x4	*
Address Complete Message (See note ACM-1)		ACM	14	*
Charging Message		CHG	24	*
Unsuccessful Backward set-up information msg	UBM		x5	*
Switching-Equipment-Congestion signal		SEC	15	*
Circuit-Group-Congestion signal		CGC	25	*
National-Network-Congestion signal		NNC	35	*
Address-Incomplete signal		ADI	45	*
Call-Failure signal		CFL	55	*
Subscriber-Busy signal (electrical)		SSB	65	*
Unallocated-Number signal		UNN	75	*
Line-Out-of Service signal		LOS	85	*
Send-Special-Information-Tone signal		SST	95	*
Access-Barred signal		ACB	A5	*
Digital Path not provided signal		DPN	B5	*
Misdialed trunk Prefix signal (for National use)		MPR	C5	*
Extended unsuccessful backward set-up info msg		EUM	F5	*
Call Supervision Message	CSM		x6	*
Answer signal, Unqualified		ANU	06	*
Answer signal, Charge		ANC	16	*
Answer signal, No charge		ANN	26	*
Clear-Back signal		CBK	36	*
Clear-forward signal		CLF	46	*
Re-Answer signal		RAN	56	*
Forward-Transfer signal		FOT	66	*
Calling party Clear signal (national option)		CCL	76	*
Extended Answer Message indication		EAM	F6	*
Circuit Supervision Message	CCM		x7	*
Release-Guard signal		RLG	17	*
Blocking signal		BLO	27	*
Blocking-Acknowledgement signal		BLA	37	*
Unblocking signal		UBL	47	*
Unblocking-Acknowledgement signal		UBA	57	*
Continuity-Check-Request signal		CCR	67	*
Reset-Circuit signal		RSC	77	*

Type	H0	H1	H1-H0 Octet	Offset
Circuit Group Supervision Messages	GRM		x8	*
Maintenance-oriented Group Blocking msg		MGB	18	*
Maintenance-oriented group Blocking-Ack msg		MBA	28	*
Maintenance-oriented Group Unblocking msg		MGU	38	*
Maintenance-oriented group Unblocking-Ack msg		MUA	48	*
Hardware failure-oriented Group blocking msg		HGA	58	*
Hardware failure-oriented group blocking-Ack msg		HBA	68	*
Hardware failure-oriented Group Unblocking msg		HGU	78	*
Hardware failure-oriented group Unblocking-Ack msg		HUA	88	*
Circuit Group Reset message		GRS	98	*
Circuit Group Reset-Acknowledgement msg		GRA	A8	*
Software Generated group Blocking msg(Nat. opt)		SGB	B8	*
Software generated group Blocking-Ack msg(Nat. opt)		SBA	C8	*
Software Generated group Unblocking msg(Nat. opt)		SGU	D8	*
Software generated group Unblocking-Ack msg(Nat. opt)		SUA	E8	*
Node-to-Node Message	NNM		x9	*
CCBS Facility Message		CFM	19	*
Call Party free Message		CPM	29	*
Call Party Answer		CPA	39	*
Closed user group Select & Validation check-request msg		CSV	49	*
Closed user group Validation check msg		CVM	59	*
Closed user group Select & Valid check-response msg		CRM	69	*
Connected Line Indentity message		CLI	79	*
Reserved for international & basic national use	-	-	xA,xB	*
Reserved for national use	-	-	xC to xF	*

Note: ACM-1

The next octet of Address Complete Message gives the following:

3 least significant bits of the octet.

Type	Hex	Mnemonic	Offset
Address-complete signal, no indication	0	-	* +1
Address-complete signal, charge, no indication	1	ADC	* +1
Address-complete signal, no charge, no indication	2	ADN	* +1
Address-complete signal, coin box, no indication	3	ADX	* +1
Address-complete signal, subscriber-free	4	-	* +1
Address-complete signal, charge, subscriber-free	5	AFC	* +1
Address-complete signal, no charge, subscriber-free	6	AFN	* +1
Address-complete signal, coin box, subscriber-free	7	AFX	* +1

* Note: For DTE & DCE Offset trigger use ANSI = 11, AT&T= 10, CCITT= 8

SIGNALLING CONNECTION CONTROL PART (SCCP)

5 bits are used in the octet

Type	Mnemonic	(5 bits) Octet	Offset
Spare	-	x0	*
Connection Request	CR	x1	*
Connection confirm	CC	x2	*
Connection refused	CREF	x3	*
Released	RLSD	x4	*
Released complete	RLC	x5	*
Data form 1	DT1	x6	*
Data form 2	DT2	x7	*
Data acknowledgement	AK	x8	*
Unit data	UDT	x9	*
Unit data service	UDTS	xA	*
Expedited data	ED	xB	*
Expedited data acknowledgement	EA	xC	*
Reset request	RSR	xD	*
Reset confirmation	RSC	xE	*
Error	ERR	xF	*
Inactivity Test	IT	10	*

* Note: For DTE & DCE Offset trigger use ANSI = 11, AT&T= 10, CCITT= 8

ISDN USER PART (ISUP)

6 bits are used in the octet

Type		Mnemonic	(6 bits) Octet	Offset
Address Complete		ACM	06	*
Answer		ANM	09	*
Blocking		BLO	13	*
Blocking acknowledgement	BLA	15	*	
Call modification completed	CMC	1D	*	
Call modification request		CMR	1C	*
Charging		CRG	(2)	*
Circuit group blocking		CGB	18	*
Circuit group blocking acknowledgement	CGBA	1A	*	
Circuit group unblocking		CGU	19	*
Circuit group unblocking acknowledgement		CGUA	1B	*
Closed user group selection and validation request		CSVR	25	*
Closed user group selection and validation response		CSVS	26	*
Continuity	COT	05	*	
Continuity check request		CCR	11	*
Delayed release		DRS	27	*
Facility accepted		FAA	1F	*
Facility deactivated		FAD	22	*
Facility information		FAI	23	*
Facility reject		FRJ	21	*
Facility request		FAR	20	*
Forward transfer		FOT	08	*
Information	INF	04	*	
Information request		INR	03	*
Initial address		IAM	01	*
Pass along	PAM	28	*	
Pause		PAU	0D	*
Reject connect modify		RCM	1E	*
Release		REL	0B	*
Release complete		RLC	10	*
Released		RLSD	0F	*
Reset circuit		RSC	12	*
Reset circuit group		GRS	17	*
Reset circuit group acknowledgement		GRA	29	*
Resume		RES	0E	*
Subsequent address		SAM	02	*
Unblocking	UBL	14	*	
Unblocking acknowledgement		UBA	16	*
Unsuccessful backward set-up information	UBM	0A	*	
User-to-user information		USR	(2)	*

* Note: For DTE & DCE Offset trigger use ANSI = 11, AT&T= 10, CCITT= 8

(2) Note: Message for further study

APPENDIX C - Communication Definitions

We have collected some of the terminology that you may encounter.

ACK	A control character (06 hex) sent to indicate successful receive of some transmitted data.
ASCII	American National Standard Code for Information Interchange. This is a set of 128 seven-bit character codes.
Baudot	An international standard teletype transmission code defined as CCITT International Alphabet No. 2. This is a 5-bit dual case code. The shift characters are letter-shift(LS) and figure-shift(FS).
BCC	Block Check Character. Typically the 16-bit CRC for Bisync communication.
BCD	Binary Coded Decimal. A number from 0 to 9 is represented by 4 bits in binary.
BERT	Bit Error Rate Test. Pseudo-random patterns are sent through a system to check its accuracy in reproducing the signal without any bit errors.
bits	A logical unit which can be in two states, 1 or 0.
bps	Bits per second.
BOP	Bit-Oriented Protocol. An individual bit, or group of bits, has a special meaning in this data protocol.
byte	A group of 8 bits. Up to 256 patterns can be formed using eight bits.
carrier	An alternating electrical signal which by amplitude, frequency, or phase change will convey information to the receiver.
CCITT	Consultative Committee - International Telegraph & Telephone.
clock	A timing signal to which control or data is synchronized.
COP	Character-Oriented Protocol. Only a whole character carries meaning in this data protocol.
CRC	Cyclic Redundancy Check. A logic equation by which each data byte is exclusive-OR, added, and shifted to form a bit pattern which is in turn sent with the data to check transmission accuracy.
CTS	Clear-to-Send line used in serial control handshaking.
digits	A number in any base. Most common is a decimal or hexadecimal number.
DCD	Data-Carrier-Detect line used in serial control handshaking.
DCE	Data Communication Equipment, such as a modem.
DDCMP	Digital Data Communication Message Protocol. A protocol for the transmission of data between stations in a point-to-point or multi-point network.
DSR	Data-Set-Ready line used in serial control handshaking.
DTE	Data Terminal Equipment like a printer, or VT-100 terminal.
DTR	Data-Terminal-Ready line used in serial control handshaking.
EBCDIC	Extended Binary-coded-decimal Interchange code. This is an 8-bit code used by IBM for their communication terminals.
EIA	Electronic Industries Association.
ETX	End of Text (03 hex).
FCS	Frame Check Sequence. Typically a 16-bit CRC used to check the accuracy of BOP frames.
frame	A block of data starting with a flag pattern and typically ending with an error check pattern. Most frames can be broken down into a flag byte, address field, control field, data field, frame check sequence, and a stop flag.
FDX	Full Duplex. The ability to send data in both directions at the same time.
HDX	Half Duplex. A system that can only send data in one direction at a time.
IPARS	International Passenger Airlines Reservation System. This is a 6-bit character code.
ISO	International Organization for Standardization.
lead	An individual wire in a physical signal interface.
link	The transmission path between two stations.

LRC	Longitudinal Redundancy Check.
NAK	Negative Acknowledgement (15 hex).
octet	Eight bits. A byte.
OSI	Open System Interconnection. An exchange standard for information by the use of procedures in a multi-level protocol.

Level 1	Physical
Level 2	Data link
Level 3	Network
Level 4	Transport
Level 5	Session
Level 6	Presentation
Level 7	Application

packet	Data grouped for transmission through a data network.
PBX	Private Branch Exchange. A local telephone exchange within a company.
PDN	Public Data Network.
RTS	Request-to-Send line used in serial control handshaking.
RI	Ring-Indicator line used in serial control handshaking.
RVK	Reservak - Air Canada Reservation Service
SBT	Six-Bit Transcode. This is a 6-bit binary-coded decimal transmission code developed by IBM.
SDLC	Synchronous Data Link Control.
Selectric	This is a 6-bit dual-case code. The shift characters are upper-case (UC) and lower-case (LC).
SNA	System Network Architecture. A communciation architecture used by IBM for transmitting information in a SNA network.
STX	Start of Text (02 hex).
TIMS	Transmission Impairment Measuring Set.
VRC	Vertical Redundancy Check.

SPECIFICATIONS:

Monitor

Protocols	Bit-oriented: X.25, SDLC/SNA, SS#7*, ISDN* (Q.921/Q.931). Character oriented: Async, Bisync, Sync, IPARS, DDCMP
Data rate	50 b/s to 64K b/s, full duplex
Clock	Internal, DTE, DCE
Line code	ASCII, EBCDIC, EBCD, IPARS-6 or HEX display
Error Check	CRC-16, CRC-6, CCITT-16, LRC/VRC, RVK
Modes	Real-time or off-line remonitor
Decode	Frames time-stamped to 1 msec resolution, freeze/mark data, show EIA lead graphic

Analysis

X.25	Decode levels 2 and 3, including Diagnosis and Cause fields
SNA	Decode TH, RH (including RU) headers
SS#7	Display FISU, LSSU, MSU decode SIO, H0/H1 fields

Trigger Modes

Events	Stop on trigger or post-trigger character, capture buffer full
Counters	Three, count to 65,535
Timer	Measure time between events 1 msec to 24 hours
Alarm	Sounds on user-defined event
Data	Mark on/off

Trigger Events

Number	6, selectable
Data	1-16 characters/bits
EIA Leads	Transition of DTR, RTS, CTS, DCD, DSR
External	EIA voltage transition
Errors	Frame or CRC (bit oriented), Parity or framing error (async) Parity, framing or BCC error (sync)
Timeout	Selectable, in seconds

Statistics Counters

X.25	66, each counts to 65,535 (Frame = 28, Packet = 38)
SDLC	44, each counts to 65,535 (Frame level only)
SS#7	46, each counts to ten billion, plus MSU loading % (FISU = 2, LSSU = 14, MSU = 18)

*Optional Feature

Display

Character	DTE/DCE in line or time-multiplexed format, DTE, DCE, EIA lead status graphics
Bit	Text or hex, frame per line
Controls	Previous/next page

Data Storage

Buffer	512 KB RAM, with battery backup, 400 KB available for data storage
Disk*	HD 3 1/2" microfloppy, 1.2 MB capacity

BERT/BLERT

Mode	Simulate DTE or DCE
Speeds	Async: 50 b/s to 19.2 kb/s Sync: 50/bs to 64 kb/s
Format	5, 6, 7 or 8 bits; 1, 1.5, 2 stop bits; odd, even or no parity
Patterns	63, 511, 1023 or 2047 PRBS Alternate 1/0, FOX message, User-defined binary pattern ≤ 48 bits
Counters	Bit and block errors, ES, EFS, latest EFS interval, blocks sent and received, sync loss
Calculations	BER, BLER, ESR, longest EFS period
Operation	Restart on regaining sync loss
Duration	Bit count, timed or continuous
Errors	Inject bit or burst

Breakout Panel

Interface	RS-232-C
Indicators	10 tri-state LEDs
Control	Open/closed switches, external jumpers
Test Jacks	Lead in/out, MARK, SPACE, EXT

General

Controls	Standard keyboard
Display	40 characters by 16 lines, 5" (diagonal) CRT, amber phosphor
Printer	Parallel output via DB-25 connector, provides printout in graphic format
Video	RS-170 composite video output (BNC), RGB Output (DB9 connector)
Clock	Time maintained by battery power
Interfaces	RS-232C: 33K Ohm (Mon)/6.8K (Sim) V.35*: 1K Ohm (Mon)/100 Ohm (Sim) RS-449/422*, X.21*: 1K Ohm S/T* (RJ-45) Basic Rate
Power	115/230 VAC, 50/60 Hz, 50 VA
Size	6.4" x 14.5" x 20"
Weight	23 lbs.

Specifications are subject to change without notice

WARRANTY

Products manufactured by CXR Telcom Corporation are guaranteed to be free of defects in materials and workmanship for a period of one year from the date of shipment. CXR Telcom will accept returned items, transportation prepaid to the service center, for repair during the warranty period at no cost to the customer, provided that the products have not been subjected to improper installation, accident, misuse, neglect, or unauthorized alterations.

Certification

CXR Telcom Corporation certifies that all products are thoroughly tested and inspected and found to meet manufacturers specifications when shipped from the factory.

Inspection

All products manufactured by CXR Telcom are carefully inspected and thoroughly tested prior to shipment. Modern packaging techniques are used to prevent damage during shipment. If goods are received in a damaged condition, A CLAIM SHOULD BE FILED WITH THE TERMINATING CARRIER IMMEDIATELY. Normally, the carrier will want to inspect the shipping carton and packing materials.

Repair Service

If equipment does not operate properly when tested in accordance with the instructions, it should be returned to an authorized service center for repair. **Call or write Customer Service for a Return Material Authorization prior to shipping any equipment to the factory.** When returning equipment for repair, utmost care should be taken to avoid shipping damage. If available, use the original cartons and packing material. Shipping charges should be prepaid.

If the equipment is covered by warranty, it will be repaired free of charge or replaced, at the Company's option, and returned prepaid. Unauthorized field repairs or modifications will invalidate the warranty.

For out-of-warranty repair work, Customer Service will provide a quotation for repair charges first, unless the shipment is accompanied by a purchase order. Repair work will be performed after authorization to proceed (in the form of a purchase order) is received.

Service Centers

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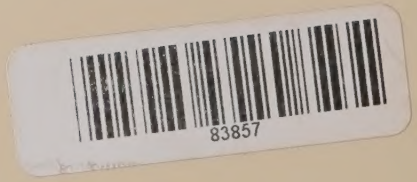
(408) 435-8520
(408) 435-1276 (FAX)

Digilog, Inc., - A CXR Company -
Attn: Customer Service
1370 Welsh Road
Montgomeryville, PA 18936
(215) 628-4530
(215) 628-0918



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